Rocky Flats
Environmental Technology Site

1-W56-COEM-AMN-101

REVISION 1

SITE DESIGN DOCUMENT CONTROL

APPROVED BY D G Ruscitto / David G. Ruscitto / 12/22/98

Site Chief Engineer, Kaiser-Hill Company, LLC — Print Name — Date

Effective Date: 1/1/99

CONCURRENCE BY THE FOLLOWING IS DOCUMENTED IN THE PROCEDURE HISTORY FILE:

Rocky Flats Closure Site Services
Rocky Mountain Remediation Services
Safe Sites of Colorado
Wackenhut Services LLC

USE CATEGORY 3
The procedure SHALL be available at a known location for reference.

Nuclear Safety Evaluation: Not Required

Independent Safety Review: Not Required

This procedure supersedes 1-W56-COEM-AMN-101, Revision 0

Periodic review frequency: 4 years from the effective date

Reviewed for Classification/UCNI

By D E Hyde UNV

Date 12/23/98

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LIST OF EFFECTIVE PAGES

Pages	Effective Date	Pages	Effective Date
1-24			

The following DCF(s) are active for this document:

None

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APPENDIXES

1. PURPOSE

The purpose of this procedure is to provide requirements for design document control at the Rocky Flats Environmental Technology Site (Site). It also describes the drawing excerpt process and eliminates the interim drawing process.

Revision 1 supersedes 1-W56-COEM-AMN-101, *Site Design Document Control*, Revision 0 and is a total rewrite. Revision bars are omitted.

2. SCOPE

The procedure applies to all personnel who develop, revise, cancel, void, and process design documents at the Site.

Examples of design documents are:

- Design, construction, or disassembly packages
- Drawings
- Calculations
- Specifications

3. OVERVIEW

AMN-101 is to be used in conjunction with 1-V51-COEM-DES-210, *Design Process Requirements,* Engineering Standard SX-300, *General Drafting Standards,* and in the development of an Engineering Design Package (EDP) for work activities/projects that require the Type 2/Type 3 Work Package Process [see MAN-071-IWCP, *Integrated Work Control Program Manual* (IWCP)].

This procedure does not apply to control of classified documents established in the *Security Manual*, Chapter 6, Identification, Protection, and Control of Classified, Unclassified, and Sensitive Information.

Drawing Excerpt

The Drawing Excerpt Process provides for changes to be made to applicable portions of a master drawing during project/activity use. The drawing excerpt receives approval by the signature process on the EO and can be used to perform work. The Drawing Excerpt Process replaces the Interim Drawing Process.

4. DEFINITIONS AND ACRONYMS

Also see Section 10 of the SERM.

4.1 Definitions

Controlled Distribution. The process which ensures the distribution of the latest issue of a controlled document to specified recipients and requires a receipt acknowledgment by the recipient.

Controlled Distribution Lists. Lists which identify the custodians of particular controlled documents who routinely receive copies of revisions.

Controlled Document. An active design document such as an EDP, drawing, calculation, or System Evaluation Report that is maintained current by the organization with programmatic responsibility and made available for centralized control, distribution, and disposition in accordance with applicable standards.

Controlled Document Custodian. A recipient of a controlled document.

Drawing. See Engineering Standard SX-300, General Drafting Standards

Information Only Copy. Copy of any document that is used for information only and cannot be used to perform work.

One-Time Distribution. Distribution of a design document for a specific one-time activity such as design document review.

4.2 Acronyms

BDCF	Baseline Document Change Form
CADD	Computer Aided Drafting Design
ECR	Engineering Change Request
EDP	Engineering Design Package
EO	Engineering Order
IWCP	Integrated Work Control Program
SSC	Structure, System, or Component
SDDC	Site Design Document Control
SERM	Site Engineering Requirements Manual

5. RESPONSIBILITIES

5.1 Designer

Completes forms from Appendix 1, as applicable.

5.2 Engineering Drafting/Computer Aided Drafting Design (CADD)

If requested, converts drawings to as-built master drawings within 90 days of job completion notification.

5.3 Project Manager/Operations Manager/Facility Manager

Ensures as-built master drawing(s) are completed to reflect actual closeout conditions of the activity/project within 90 days of job completion notification.

Submits the as-built master drawing(s) to SDDC.

5.4 Responsible Engineering Manager

Ensures that the review and approval of completed design/excerpt drawings is conducted in accordance with DES-210/AMN-101.

See DES-210 and IWCP for responsibility for approval of other documents submitted to SDDC.

5.5 Site Design Document Control

All Site design documents are maintained and controlled by Site Design Document Control (SDDC) located in Building 130.

6. INSTRUCTIONS

6.1 Design Document Control

The EO is the form used to submit design documents into SDDC for control and maintenance. The EO is also the form used to request that SDDC distribute a controlled design document.

The EO replaces the following forms from AMN-101, Revision 0:

- Engineering Order
- Controlled Distribution Request
- Document Release Form

There are two types of controlled document distributions used by SDDC:

1. One-time Distribution is used for distribution of a document for a specific activity such as a design document review.

2. Controlled Distribution is used to ensure that the Document Custodian receives the latest revision of the document when it is released (for example, floor plans and utility drawings).

Controlled engineering documents are uniquely identified with a control identification stamp on the first page of the document. A document that does not have a document control stamp on the first page is an "Information Only" copy. A controlled electronic copy issued by SDDC or a copy obtained from the Site intranet is considered an "Information Only" copy. The following table provides the list of controlled document stamps, their meaning, and availability for use:

Table 1, Controlled Document Stamps

Stamp	Meaning	Availability for Use
CONTROLLED COPY	Revisions to the document will automatically be issued to the copy holder.	Available to use for applicable Site activities.
INFORMATION ONLY	Revisions to the document will not be sent to copy holders.	Cannot be used to perform work.

6.1.1 Submitting a Design Document to SDDC

[1] Complete applicable sections of the EO.

[2] Submit the EO and the document to SDDC.

6.1.2 Requesting Release of a Design Document from SDDC

[1] To request one-time or controlled distribution of a document, complete the EO including distribution information.

[2] To request an "Information Only" copy of a document, obtain a Reproduction Request from SDDC and submit the completed form back to SDDC.

6.2 Drawing Control and Distribution

There are three types of drawings used at the Site.

- Design Drawing. Any drawing (new, excerpt, or interim) used or developed during the design phase of a project/activity. This drawing reflects the requirements of a specific design.
- Approved Drawing. A design drawing that has been fully signed off (approved) and has been submitted to SDDC for control and maintenance. An approved drawing is used for construction, for procurement of items, and for manufacturing items.
- Master Drawing. An approved drawing that reflects the post-construction/post-procurement/post manufacturing configuration of any Structure, System, or Component (SSC) and has been submitted to SDDC for control and maintenance.

A new drawing is created when no approved or master drawing is on file in SDDC.

Approved and master drawings can be revised. The Drawing Excerpt Process is a method for revising only the portion of an approved or master drawing that is need for the performance of a project or activity. Work can be performed to a drawing excerpt. The drawing excerpt is incorporated into the appropriate master drawing during the closeout phase of a project.

An approved drawing can be canceled when there is no longer a need for the drawing to exist, such as the cancellation of a project prior to completion of work. A master drawing can be voided when the drawing no longer reflects the configuration of the SSC it represented.

SDDC generates an Engineering Drawing Report quarterly that lists master drawings available for Site use.

No new interim drawings will be issued after the effective date of this procedure. Interim drawings that have been canceled by SDDC will not be reactivated.

6.2.1 Creating a New Drawing

Designer

[1] Create the new drawing. A drawing must meet the size requirements as described in SX-300.

[2] Obtain a new drawing series number from SDDC.

[3] Assign a subnumber and complete the new drawing in accordance with Site Engineering Standard SX-300.

[4] Release the drawing to SDDC. Drawings that are part of a package are released with the package in accordance with DES-210 or IWCP. Drawings that are not part of a package, such as an engineering standard drawing, are released using an EO.

6.2.2 Revising a Drawing

Designer

[1] Obtain a Drawing Interference Report from SDDC which shows what activities/projects are utilizing the same master drawing.

[2] Revise the master drawing using hand-drawn or CAD changes, a photograph, or a sketch.

[3] Release the drawing to SDDC. Drawing revisions that are part of a package are released with the package in accordance with DES-210 or IWCP. Drawings that are not part of a package, such as an engineering standard drawing, are released using an EO.

IWCP. Drawings that are not part of a package, such as an engineering standard drawing, are released using an EO.

6.2.3 Revising a Project/Activity Drawing using the Drawing Excerpt Process

Designer

[1] Obtain a Drawing Interference Report from SDDC which shows what activities/projects are utilizing the same master drawing.

[2] Place the applicable drawing excerpt on the Drawing Excerpt Form (Appendix 2).

[3] If the drawing excerpt is larger than the Drawing Excerpt Form, attach the Title Block from the Drawing Excerpt Form to the created excerpt (A generic title block may be used provided it contains all the information on the Drawing Excerpt Form.).

[4] Release the drawing to SDDC. Drawings that are part of a package are released with the package in accordance with DES-210 or IWCP. Drawings that are not part of a package, such as an engineering standard drawing, are released using an EO.

6.2.4 Canceling a Drawing

Designer

[1] Submit an EO to SDDC as notification to cancel all outstanding active and/or inactive approved drawings created for the project.

[2] If work has been accomplished on a canceled project, redline the master drawing in accordance with DES-210 to reflect field conditions.

6.2.5 Voiding a Drawing

Designer

[1] Void a master drawing by indicating on a Baseline Document Change Form (BDCF) the master drawing is to be voided at closeout (see DES-210, Form 7).

[2] Include the BDCF with the EDP.

[3] To void a non-project type drawing such as engineering standard drawings, building plans, and utilities drawings, submit an EO to SDDC identifying the non-project drawing to be voided.

[4] If drawings are to be voided at closeout, retain the drawings to be voided during the construction work activity. Redline comments do not need to be incorporated into the master drawing if the drawing is voided (also see DES-210).

6.2.6 Closeout

Project Manager/Operations Manger/Facility Manager

Upon final closeout of a project, return all drawings to SDDC as either an approved drawing that has been redlined or as an as-built master drawing.

7. RECORDS

7.1 Records Management

Requirements for preparation, identification, distribution, and storage of controlled documents are addressed in 1-V41-RM-001, *Records Management Guidance for Records Sources.*

7.2 Non-Quality Assurance Records

No Non-Quality Assurance Records are generated by this procedure.

7.3 Quality Assurance Records

Quality documents and drawings generated by the performance of this procedure are managed in accordance with 1-V41-RM-001.

Site Design Document Control

[1] Maintain original manual drawings in the vault.

[2] Archive CAD drawings.

7.4 Active Records

Active records necessary to perform engineering design are maintained and stored by Site Design Document Control in accordance 1-V41-RM-001. These records include but are not limited to the following:

- Drawings
- New design
- Construction Drawings
- Engineering Change Requests
- As-builts

8. REFERENCES

Engineering Standard SX-300, General Drafting Standard

MAN-027-SERM, Site Engineering Requirements Manual

MAN-071-IWCP, Integrated Work Control Program Manual

Security Manual

1-V41-RM-001, Records Management Guidance for Records Sources

1-V51-COEM-DES-210, Design Process Requirements

APPENDIX 1

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RFETS — ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE	Engineering Order	1-W56-COEM-AMN-101 Appendix 1

Section 1: Document Identification

1. IWCP/Authorization Project Number	2. Building	3. Date	4. Page 1 of

5. Modification Title

Section 2: Document Description

6A. Package Description
☐ Review ☐ Final ☐ Other:

☐ Engineering Design Package
Type: ☐ ESP ☐ RDP
☐ Temporary; TM Number: _____
Calculated TM Design Life Date: _____

☐ Engineering Change Request (ECR)
ECR Type ☐ 1 ☐ 2 ☐ 3
ECR Number: _____

Total pages of text: _____
Total drawings attached: _____

6B. Other Type Document
☐ Drawing ☐ Number of Drawings attached
☐ Calculation
☐ System Evaluation Report (SER)
☐ Engineering Operability Evaluation (EOE)
☐ Other (Describe):

7. Have any of these documents been in an RCA/RMMA?
☐ Yes ☐ No
If yes, were they self-monitored?
☐ Yes ☐ No
Verified by:

Print/ Sign/ /Date

Section 3: SDDC Action Requested

9. Controlled Distribution Request
If other than EDP/ECR, list document information in Section 5
☐ DISTRIBUTE Controlled Document
☐ Controlled ☐ One Time
☐ New - Go to Section 4
☐ Controlled Distribution List on file
☐ DELETE from Controlled Distribution
Go to Section 4 or 5 as applicable.

10. RELEASE Document for:
☐ Review
☐ Final
If SDDC Distribution, Go to Section 4
Go to Section 5 to list applicable documents

11. REMOVE controlled drawing:
☐ Cancel Approved Drawing
☐ Void Master Drawing (see BDCF if applicable)

8A. System Category
☐ 1/2 ☐ 3 ☐ 4

8B. SSC Function:

Section 4: Distribution

12. Distribution

Name/Organization	Bldg.	Dwgs B or D	No. of Copies
DOE Safety Health Assessment (Final Only)	460	B	1
Additional Distribution (See Section 4A on EO Page 2)			
Total Copies Required			

Section 5: Document Information

13. Document Description

Document Number	Document Title

12A. Reviewed for Classification/UCNI

12B. If Document is UCNI, place stamp below.

Section 6: Tracking Information

14. Requestor Name (Print)	15. Phone/Pager	16. Charge Number

17. Landlord Company	18. Company Authorizing Design	19. Company Performing Design

20. SDDC/EO Coordinator (Print)	21. Date	22. EO Number	23. EO Distribution Date

(01/99)

APPENDIX 1

ENGINEERING ORDER - FORM COMPLETION INSTRUCTIONS

Block	Instructions
Note: Use the Continuation Sheet (DES-210, Form 9) if more room is required.	
Section 1: DOCUMENT IDENTIFICATION	
1-5	Enter the IWCP/Authorization Project Number, Building, Date, total number of pages, and Modification Description Title.
Section 2: DOCUMENT DESCRIPTION	
6A	Check boxes and enter requested information as applicable. If document is other than an EDP/ECR, see Block 6B.
6B	Check boxes as applicable. If drawings are attached, enter the number of attached drawings in the box provided.
7	Check boxes as applicable. Verified by - print name, sign, and date indicating who verified these documents have/have not been in an RCA/RMMA.
8A	Check System Category box as applicable.
8B	Enter brief description of the Structures, Systems and Components (SSC) function.
Section 3: SDDC ACTION REQUESTED	
9	Controlled Distribution Request: Check boxes as applicable. Complete Section 4 if new or if revising Controlled Distribution List. Complete Section 5 if document other than an EDP/ECR.
10	Release Document Request: Check box as applicable. If document is not an EDP/ECR, provide document description in Section 5. If document is being released to SDDC for "Distribution," see Block 9 instructions.
11	Check the appropriate box. If the drawing is not part of a project/activity, a BDCF is not needed.
Section 4: DISTRIBUTION	
12	**NOTE:** *Go to Section 4A on EO Page 2 to enter additional distribution.* Enter the name and organization. Enter the recipient's location (building). Enter B (for ½ size drawings) or D (for full size drawings). Enter the number of copies. Enter total number of copies required for Additional Distribution from Section 4A on Form 1A, if applicable. Enter total number of copies required for distribution.
Section 5: DOCUMENT INFORMATION	
	If the document is other than an EDP/ECR, complete this section for: ▪ Requesting controlled distribution services from SDDC (also see Block 9) and/or ▪ Releasing a document to SDDC (also see Block 10).
13	Enter Document Number and Title
13A	Authorized Derivative Classifier: Sign name indicating reviewed for classification in accordance with DOE Order 5650.2B, The Classification Information and DOE Order C471.1, Identification and Protection of Unclassified Controlled Nuclear Information.
13B	Classifier: If Document Contains UCNI Material, place stamp in block.
Section 6: TRACKING INFORMATION	
14-16	Enter Requestor Name, Phone/Pager, and Charge Number.
17-19	Enter Landlord Company, Company Authorizing Design, and Company Performing Design
20-23	Enter Site Design Document Control (SDDC) support personnel name or designated Engineering Order (EO) Coordinator name (as applicable) and the Date; EO number, if applicable; and EO Distribution Date, if applicable.

APPENDIX 1
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RFETS	ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE	Engineering Order - Continued	1-W56-COEM-AMN-101 Appendix 1

Section 1A: Document Identification

24. IWCP/Authorization Project Number	25. Building	26. Date	27. Page 2 of
28. Modification Description Title			

Section 4A: Continued Distribution

29. Distribution

Name/Organization	Bldg.	Dwgs B or D	No. of Copies

Section 7: Documents Affected

30. Design basis documents affected: (NOT for EDPs/ECRs; use BDCF)

Doc Type	Doc Number	Doc Title

Section 8: Review Concurrence and Approval (not required for SERs and EOEs)

Organization/Title	Name: Print/Sign/Date	Company	Phone/Page	Signature on File
31. Designer [1]				
32. Responsible Engineering Manager [1]				
33. Design Checker [1]				
34. Health & Safety [2,5]				
35. Landlord [2]				
36. Criticality Safety Engineer [3,5]				
37. Nuclear Safety Engineer [3,5]				
38. Radiological Engineer [4,5]				
39.				
40.				
41.				
42.				
43.				
44.				
45.				

1-Original Signatures Required for ESP and RDP Engineering Design Packages.

2- Required for EDP Engineering Design Package.

3-Required if design involves fissionable material operations as defined in Nuclear Criticality Safety Manual.

4-Required if ALARA Design Review Screen fails.

5-Telecom approval allowed. See instructions on back of form for documentation requirements.

(01/99)

APPENDIX 1

ENGINEERING ORDER - CONTINUATION FORM COMPLETION INSTRUCTIONS

Block	Instructions
Note: Use the Continuation Sheet (DES-210, Form 9) if more room is required.	
Section 1A: DOCUMENT IDENTIFICATION	
24-28	Enter information from EO, Section 1, Page 1.
Section 4A: CONTRIBUTED DISTRIBUTIUON	
29	See instructions on EO, Section 4, Page 1.
Section 7: DOCUMENTS AFFECTED	
	Use this section if applicable, however, DO NOT use this section in place of the Baseline Document Change Form (BDCF) as required for an EDP/ECR in DES-210.
30	Enter Document type, Document Number, and Document Title of all affected documents.
Section 8: REVIEW CONCURRENCE AND APPROVAL	
31-38	Obtain required concurrence and approval signatures for EDPs/ECRs. Refer to signature notes at bottom of EO, Page 1 and to DES-210.
39-45	For all other documents, including EDPs/ECRs, enter the Organization/Title, Name (obtain signature), Company represented, and phone/pager of individual. "Signature on File" (/s/) is acceptable ONLY if the reviewer signed concurrence on the Review Comment Sheet and is not one of the designated reviewers in this section.
Telecom Approval [5]	Telecom approval may be obtained if authorized by the Responsible Engineering Manager. Reviews are to be documented on a Review Comment Sheet. If authorized, document telecom approval as follows: In Name Column, print the name of the individual providing telecom approval followed by: "Telecom Approval", then enter your initials and date of approval.

APPENDIX 2

DRAWING EXCERPT FORM

RFETS	ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE	Drawing Excerpt Form	1-W56-COEM-AMN-101 Appendix 2

Title Block Sheet ___ of ___

Excerpt of Master Drawing Number: _____ Revision / Issue _____

Approved for use with
IWCP/Authorization Project Number: _____

If the drawing excerpt is too large, remove the Title Block Section from this form and attach it to the drawing excerpt. Cross out existing Title Block, if showing.

Note: All approval and classification signatures are submitted with the Engineering Order form.

(01/99)

APPENDIX 2

DRAWING EXCERPT FORM - COMPLETION INSTRUCTIONS

Block	Instructions
Drawing Excerpt	Attach the excerpt of the drawing, or sketch of the drawing, onto the space provided on the Drawing Excerpt Form. If the excerpt of the drawing is too large to fit onto Drawing Excerpt Form, remove the Title Block portion of Drawing Excerpt Form and attach the completed Title Block to the excerpt. Cross out the existing Title Block if showing. If a drawing excerpt contains information from more than one approved or master drawing, identify which approved or master drawing belongs to each portion of the excerpt.
Title Block	Enter the Number of the approved or master drawing, Revision or Issue, Integrated Work Control Package (IWCP)/Authorization Project Number. If warranted, additional information can be added to the Title Block description.

DOCUMENTATION

SEPARATION

SHEET

Rocky Flats
Environmental Technology Site
1-V51-COEM-DES-210
REVISION 4
DESIGN PROCESS REQUIREMENTS

APPROVED BY D G Ruscitto / David G. Ruscitto 12/23/98
Site Chief Engineer, Kaiser-Hill Company, LLC — Print Name — Date

Effective Date: 1-15-99

CONCURRENCE BY THE FOLLOWING IS DOCUMENTED IN THE PROCEDURE HISTORY FILE:

Rocky Flats Closure Site Services
Rocky Mountain Remediation Services
Safe Sites of Colorado
Wackenhut Services LLC

USE CATEGORY 3
The procedure SHALL be available at a known location for reference.

Independent Safety Review: SORC-98-030, 12/15/98 ~~10/15/98~~ LAD

Nuclear Safety Review: SES-RFP-99.0363-DCS, 12/23/98

The following have been incorporated into this revision:
DCF-Revision 4

This procedure supersedes 1V51-COEM-DES-210, Revision 3

Periodic review frequency: 4 years from the effective date

Reviewed for Classification/UCNI
By DGR UNC
Date 12/23/98

PADC-1997-00040

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LIST OF EFFECTIVE PAGES

Pages	Effective Date	Pages	Effective Date
1 - 71	01/15/99		

The following DCFs are active for this document:

NONE

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APPENDIXES

1. PURPOSE

The purpose of this procedure is to provide requirements for developing an Engineering Design Package (EDP) at the Rocky Flats Environmental Technology Site (Site). It also establishes technical content and format to use when developing an EDP.

All engineering requests or document releases to Site Design Document Control (SDDC) are submitted on an Engineering Order (EO) in accordance with Appendix 1 of 1-W56-COEM AMN-101, *Site Design Document Control.*

Revision 4 is a total rewrite superseding 1-V51-COEM-DES-210, Revision 3; therefore, the revision bars are omitted. Revision 4 is being released in conjunction with AMN-101, Revision 1, and Engineering Standard SX-300, *General Drafting Standards*, Revision 1, which introduce the drawing excerpt process and eliminate the interim drawing process.

2. SCOPE

DES-210 is executed in association with AMN-101, SX-300, and MAN-071-IWCP, *Integrated Work Control Program Manual* (IWCP).

This procedure applies to the development of all engineering design products and is used for creating, reviewing, approving, releasing, redlining, and as-building Design Output Documents to be used on Site for construction, modification, or decommissioning of Site structures, systems, or components (SSCs).

When designing products intended for use at the Waste Isolation Pilot Plant (WIPP), additional engineering requirements may be necessary according to 1-MAN-008-WM-001, *Transuranic (TRU) Waste Management Manual.*

2.1 Engineering Design Involving Integrated Work Control Program

In accordance with IWCP, all EDPs will be developed using a IWCP Type 2 or Type 3 Work Package. An IWCP Type 3 Work Package is developed according to the IWCP Type 2 Work Package instructions (see Section 8).

A typical IWCP Type 2 or Type 3 Work Package (also see Figure 1) contains the following elements:

1. Type 2 Work Package Cover Sheet (IWCP, Chapter 5 and Appendix 5.1)

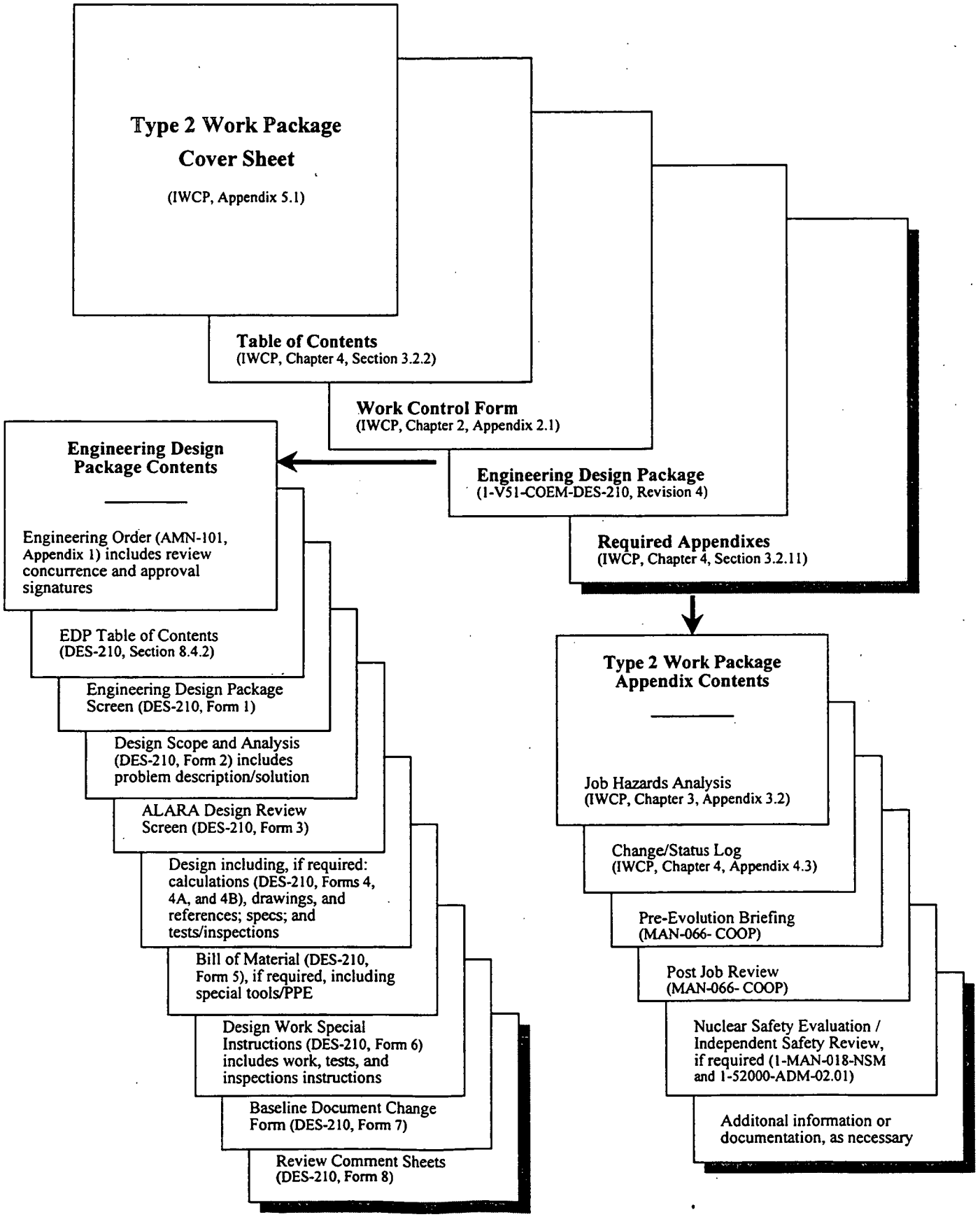
2. Table of Contents

3. Work Control Form (IWCP, Appendix 2.1)

4. Engineering Design Package, ESP or RDP (DES-210)
   - Engineering Order (AMN-101, Appendix 1) including all review/concurrence and approval signatures
   - Table of Contents
   - Problem description/solution
   - Design including calculations, specifications (Construction Specification Institute (CSI) format), tests and inspections such as Post-Maintenance Testing (PMT), and drawings (new drawings, excerpts, and revisions), and references
   - Special work instructions

5. Required Appendixes (per the IWCP) such as Job Hazards Analysis (JHA), Status Log, Pre-Evolution Briefing (PEB), special tools, personnel protective equipment (PPE), Post-Job Review (PJR), Nuclear Safety Evaluation, or Independent Safety Review.

Figure 1, Typical IWCP Type 2 Work Package Contents



A team-based approach is used for developing the IWCP Type 2 or Type 3 Work Package (see IWCP, Chapter 5 and 6). The Planning Team consists of appropriate engineers, planners, craft, safety, and operations personnel as well as other necessary subject matter experts.

3. DESIGN AUTHORITY

See Section 4.4 of MAN-027-SERM, *Site Engineering Requirements Manual* (SERM).

4. OVERVIEW

Adherence to this procedure by the integrating contractor, principal subcontractors, and associated independent contractors is prescribed in Section 5.6 of the SERM. The SERM is the requirements manual for the Site engineering program. All requirements in the SERM are based on DOE Orders and Standards, Federal and State regulations, standard industry codes and practices, and Kaiser-Hill [or Integrating Management Company (IMC)] requirements.

4.1 As Low As Reasonably Achievable

Modifications to existing facilities, and the design of new nuclear facilities, incorporate As Low As Reasonably Achievable (ALARA) features in accordance with the *Site Radiological Control Manual.*

4.2 Design Interfaces

See Section 5.6 of the SERM.

4.3 Explosives Safety

Design of a new explosives facility and modification to an existing facility, such as the Site security force munitions storage building, must conform to the safety requirements established in DOE M 440.1-1, *DOE Explosives Safety Manual.*

Facility structural design must comply with the following:

- TM5-1300, *Structures to Resist the Effects of Accidental Explosions*
- DOE/TIC-11268, *A Manual for the Prediction of Blast and Fragment Loading of Structures*

TM5-1300 requires that blast-resistant design for personnel and facility protection be based on the TNT equivalency *increased by 20 percent* of the maximum quantity of explosives and propellants permitted.

4.4 Integrated Safety Management

See Section 3.6 of the SERM.

4.5 Site-applicable Requirements

See Section 3.2 of the SERM.

4.6 Software Testing/Validation

See Section 5.5.4 of the SERM.

4.7 Verification and Validation

See Section 5.6 of the SERM.

5. DEFINITIONS AND ACRONYMS

Also see definitions and acronyms in AMN-101, SX-300, IWCP, and the SERM.

5.1 Definitions

ALARA. See IWCP Glossary.

Authorization Basis. See 1-MAN-018-NSM, *Nuclear Safety Manual.* The NSM definition also applies to non-nuclear industrial facilities.

Authorization Project. A construction or decommissioning project authorized by Congress and assigned to a Project Manager.

Checking. In-depth determination that the design is correct and meets industry and Site Engineering Standards.

Construction Specifications Institute. See IWCP Glossary.

Deactivation. The process of placing a facility/infrastructure/SSC operation or component in a safe and stable condition to minimize the long-term cost of a surveillance and maintenance program in a manner that is protective of workers, the public, and the environment.

Decommissioning. See *Nuclear Safety Manual.*

Decontamination. See *Nuclear Safety Manual.*

Decontamination and Decommissioning. See IWCP Glossary.

Demolition. Demolition means removal or destruction of the facility, the salvage of materials (if necessary), the packaging of bulk materials (if necessary), and the turnover of the facility to environmental restoration (if necessary).

Design Basis. See *Nuclear Safety Manual.*

Design Change. Changes to an approved design that alters the project technical scope or design basis requirements.

Design Input. Those criteria, parameters, design bases, or other design requirements upon which detailed engineering design is based.

Design Output. Drawings, calculations, specifications, and other documents that fulfill technical requirements of SSC and computer programs.

Design Process. Technical and management processes that commence with identification of design input and that lead to and include the issuance of Design Output Documents.

Design Review. The formal review of an existing or proposed design for the purpose of detection and remedy of design deficiencies which could affect fitness for use and environmental aspects of the product, process, or service and/or identification of potential improvements of performance, safety, and economic aspects.

Dismantlement. Dismantlement means the taking apart and removal of any facility/infrastructure/SSC during decommissioning.

End-user. The person or group who is responsible for the SSC upon completion of the activity/project.

Engineering Analysis. An engineering evaluation of an existing, proposed, or postulated condition. An engineering analysis can be used to document, justify, or support project activities such as:

- Safety Analysis Report parameter change
- Possible approaches for operating strategy
- Testing results
- Engineering feasibility or approach for SSC modification
- Engineering decisions made during the development of a modification
- Disposition of Nonconformance Reports
- Documentation of walkdowns
- Operability determination

Engineering Change Request (ECR). Changes to a design package that has been final released .

Engineering Order (EO). See AMN-101, Appendix 1.

Enhanced Work Planning (EWP). See IWCP, Chapter 5.

Final Safety Analysis Report (FSAR). See *Nuclear Safety Manual.* For industrial facilities, see the Site *Safety Analysis Report* (SAR).

Graded Approach. See IWCP Glossary.

Job Hazards Analysis (JHA). See IWCP Glossary.

Independent Verification. The act of examining the design document or process after checking and prior to approval.

Interface Discipline Engineer. Engineer from a separate discipline that provides technical design interface input, as needed, to the Design Engineer.

Interface Discipline Review. An evaluation which is performed outside of the originating Engineer's discipline to verify that other discipline information is correct.

Interference Report. A document created from the SDDC Engineering Drawing Database that lists those drawings and jobs currently in progress which could interfere/impact new design activities/projects.

Landlord. The major subcontractor representative responsible for the facility/infrastructure/SSC operation for which the EDP is applicable.

Limiting Condition for Operation. See *Nuclear Safety Manual.*

Minor Design Change. Any change that does not affect the design basis or scope. Also see Engineering Change Request.

Natural Phenomena Hazard Performance Category. See Site Engineering Standard SC-206, *Natural Phenomena Hazard Analysis of SSCs.*

Phased Closeout. EDP closed-out in parts (or phases) prior to submitting the IWCP Type 2 or Type 3 Work Package for final closeout.

Planning Team. See IWCP Glossary.

Procurement Levels. See 2-C93-COEM-DES-273, *Engineering Standards for Procurement.*

Project. A nonroutine, complex scope of activities with firmly scheduled beginning and end points, specific performance requirements, established costs, and cognizant management, planning, and control elements. A project will result in discreet products and deliverables, may involve multiple organizations, and may be capital or expense funded. Facility/infrastructure/SSC projects at the Site include all new construction and modifications to existing facilities/infrastructure/SSCs, design features that facilitate decommissioning, dismantlement, and demolition, and procurement of new equipment under the capital equipment program. Routine maintenance and service contracts are not generally classified as projects.

Quality. The degree to which an item or process meets or exceeds the user's expectations/requirements. (Also see *Site Quality Assurance Manual.*)

Quality Assurance (QA). See *Nuclear Safety Manual.*

Scope. See IWCP Glossary.

Sketch. A noncontrolled drawing used for clarification during design, construction, decommissioning, or temporary modification. If documentation of the information on a sketch is required, a sketch may be used to create a new master drawing or revise an existing master drawing by following the excerpt process (see AMN-101).

System Category. The classification method used for determining the level of standards and quality assurance that apply to SSCs, based on the safety significance of the SSCs (see Appendix 1). There are three system categories at the Site.

NOTE *System Category 1 and System Category 2 are combined into the System Category 1/2 because the requirements applicable to each is the same.*

- System Category 1/2. Engineered safety features credited or designated in an approved Authorization Basis document that have been determined to be essential to protect the public and the collocated worker from radiological harm. These SSCs are directly relied upon to prevent or mitigate significant radiological releases. For design activities where DOE Order 6430.1A, *General Design Criteria* applies, those SSCs that meet the Safety Class criteria in Section 1300-3 of DOE Order 6430.1A.

  Those noncredited or nondesignated engineered SSCs whose failure could potentially inhibit or prevent credited or designated System Category 1/2 SSCs from performing their intended safety function are classified as System Category 1/2.

- System Category 3. SSCs that are relied upon for regulator-required worker protection from radiological or toxicological hazards.

- System Category 4. SSCs that do not meet the requirements of System Category 1/2 or System Category 3.

Technical Basis. A justification for the acceptability or suitability of an engineering methodology.

Temporary Modification. See Section 5.5.5 and Section 10 of the SERM.

Vital Safety Functions. Those functions described within the Final Safety Analysis Report (FSAR) or System Evaluation Report (SER), Accident Analysis, and supporting analyses that are relied upon to detect or mitigate the radiological consequences of a credible accident, including criticality. (For Category criteria, see System Category.)

Work Package. See IWCP Chapters 4 and 5.

5.2 Acronyms

ALARA	As Low As Reasonably Achievable
BDCF	Baseline Document Change Form
BFO	Basis for Operation
BIO	Basis for Interim Operation
BOM	Bill of Material
CC	construction component
COOP	Conduct of Operations
CSI	Construction Specifications Institute
ECR	Engineering Change Request
EDP	Engineering Design Package
EO	Engineering Order
EOE	Engineering Operability Evaluation
ESP	Engineering Support Process
FSAR	Final Safety Analysis Report
ISR	Independent Safety Review
IWCP	Integrated Work Control Program
JHA	Job Hazards Analysis
LCO	Limiting Condition of Operation
NPH	Natural Phenomena Hazard
NSE	Nuclear Safety Evaluation
NSM	Nuclear Safety Manual
PEB	Pre-Evolution Briefing
PJR	Post Job Review
PMO	Preventive Maintenance Order
PPE	Personnel Protective Equipment
RDP	Regular Design Package
SAR	Safety Analysis Report

SDDC	Site Design Document Control
SER	System Evaluation Report
SERM	Site Engineering Requirements Manual
SO	systems operational
SSC	structure, system, or component
TM	temporary modification
TOC	table of contents
WIPP	Waste Isolation Pilot Plant

6. QUALIFICATIONS

Specific qualifications have been established for the major performers involved in an EDP.

6.1 Designer

Possesses, as a minimum, four years engineering experience or a four-year Bachelor of Science degree in an engineering discipline.

Possesses engineering experience and/or Engineering degree within the applicable working discipline as classified and authorized by the cognizant Company Chief Engineer and the company's Human Resources department. The Designer function may be performed by personnel with Design Checker or Responsible Engineering Manager qualifications.

6.2 Design Checker

Possesses, as a minimum, a four-year Bachelor of Science degree in Engineering or a related Science degree, preferably a Professional Engineer (PE).

Possesses a minimum of four years engineering-related experience within the applicable working discipline as classified and verified by Human Resources. Experience that is job-related may be substituted for the required education on a case-by-case basis as authorized by the cognizant Company Chief Engineer and the company's Human Resources department per DOE Order 5480.20A, *Personnel Selection, Qualification and Training Requirements for DOE Nuclear Facilities*.

Possesses technical authority/responsibility for the Engineering tasks to be performed.

Possesses approval by the cognizant Company Chief Engineer and the company's Human Resources department to perform tasks consistent with the individual's qualifications and experience.

6.3 Independent Verifier

Possesses, as a minimum, a four-year Bachelor of Science degree in Engineering or a related Science degree, preferably a Professional Engineer (PE).

Possesses a minimum of four years engineering-related experience within the applicable working discipline as classified and verified by Human Resources. Experience that is job-related may be substituted for the required education on a case-by-case basis as authorized by the cognizant Company Chief Engineer and the company's Human Resources department per DOE Order 5480.20A.

Possesses approval by the cognizant Company Chief Engineer and the company's Human Resources department to perform tasks consistent with the individual's qualifications and experience.

6.4 Responsible Engineering Manager

Possesses, as a minimum, a four-year Bachelor of Science degree in Engineering or related Science degree, preferably a Professional Engineer (PE).

Possesses a minimum of four years nuclear-related engineering experience OR has exemption from the four years nuclear-related engineering experience requirement if approved by the Site Chief Engineer. Experience that is job related may be substituted for the required education on a case-by-case basis as authorized by the cognizant Company Chief Engineer and the company's Human Resources department per DOE Order 5480.20A.

Possesses approval by the cognizant Company Chief Engineer and the company's Human Resources department to perform tasks consistent with the individual's qualifications and experience.

7. RESPONSIBILITIES

This section includes responsibilities necessary for engineering design. Additional design responsibilities and specific responsibilities relative to incorporating EDPs into IWCP Type 2 Work Packages are in Section 8 of this procedure and IWCP, Chapter 5.

7.1 Designer

Determines the System Category in accordance with Appendix 1, when requested.

Requests an Interference Report from SDDC to show interactions between projects and documents.

Performs walkdown(s) to ensure the technical scope is accurate.

Performs walkdown(s) with craft and support personnel to ensure minimum changes are made to meet activity/project requirements.

Notifies appropriate building personnel when a design affects a building surveillance or other building function.

Ensures that ergonomic considerations are incorporated into the initial design of new equipment and/or processes.

Performs a drawing search for drawings related to the proposed activity/project.

Obtains input from appropriate end-user organizations (for example, Operations personnel) during initial design development to ensure factors that may affect the design parameters have been identified.

Prepares the appropriate Design Output Documents such as the following:

- Bill of Material (BOM)
- Calculations, as necessary to the design
- Component Checklists and System Operability Tests

- Design Specifications
- Drawings
- Testing and Inspection Plans
- Post-Maintenance Tests (PMTs)

For package review,

- Ensures that the required and appropriate technical disciplines and end-users are involved in reviews of the package
- Submits copies of the EDP with an attached Review Comment Sheet for review (see Appendix 2, Form 8)
- Prepares disposition of reviewer's comments on Review Comment Sheet(s)
- Resolves comments with reviewer as necessary
- Obtains reviewer's concurrence on the Review Comment Sheet(s)

Ensures all applicable package forms are complete including all approval signatures on applicable DES-210 forms and the EO (AMN-101, Appendix 1).

Ensures completed and approved *original* packages are submitted to SDDC.

Does **not** also function as the Design Checker, Independent Verifier, or Responsible Engineering Manager for the same EDP.

7.2 Design Checker

Performs an independent technical check of design documents in the EDP to verify that:

- Documents are administratively correct
- Controlled documents included in the package meet the requirements of Site Engineering Standard SX-300 (for example; all required signatures are included, drawings are properly numbered) to avoid issuance delays
- Documents are technically adequate
- System Category is correct
- Design assumptions are realistic
- Verifications supporting design decisions are adequate
- Methods and approach for the design are appropriate
- References are provided

- Proper design inputs and construction techniques are used
- Appropriate codes and standards are used
- ALARA considerations have been incorporated

Checks accuracy of the calculation and design.

Signs all checked drawings and calculations after comments have been resolved.

Does **not** also function as the Designer, Independent Verifier, or Responsible Engineering Manager for the same EDP.

7.3 Independent Verifier

Performs the EDP verification required for ONLY System Category 1/2 OR as defined in the Site Engineering Standard SC-206, *Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components.*

Verifies the checked document or process prior to approval or concurrence.

Determines that sound engineering/scientific principles and appropriate standards were used.

Determines applicable requirements and design bases are incorporated.

Verifies construction/assembly techniques to implement the design.

Does **not** also function as the Designer, Design Checker, or Responsible Engineering Manager for the same EDP.

7.4 Responsible Engineering Manager

Selects a qualified Designer, Design Checker, and an Independent Verifier.

Ensures disposition of unresolved EDP comments.

Ensures company policies, procedures, and Site Engineering Standards were followed.

Ensures administrative and technical reviews were accomplished by qualified individuals and comment disposition was acceptable.

Approves and signs off controlled Design Output Documents.

Delegates design package signature authority to another qualified individual in his/her absence.

Does **not** also function as the Designer, Design Checker, or Independent Verifier for the same EDP.

7.5 Site Design Document Control

Processes the Design Output Documents.

Maintains control of Design Output Documents in accordance with approved procedures.

8. INSTRUCTIONS

The tasks presented in this section are followed to develop an Engineering Design Package (EDP). All forms, drawings, and other documentation necessary for a specific task are assembled into the EDP.

Appendix 2 contains forms to use for development of an EDP (also see Figure 1 in Section 2.1). Additional forms that are generated in accordance with Site documents outside of DES-210 are included in the EDP appendix section.

The Continuation Sheet (Appendix 2, Form 9) can be used as additional pages for completing a form or to document additional information not included on a form. As many Continuation Sheets as needed may be used.

Most engineering-related requests for service or document releases to SDDC are submitted with an Engineering Order (EO) form in accordance with AMN-101, Appendix 1. Several EOs may be required throughout the development of an EDP. Final release of the EDP requires an EO that includes concurrence and approval signatures.

8.1 TASK 1 Determine the Engineering Design Package Approach

This task provides a graded approach to determine whether the EDP requires minimal or comprehensive documentation and review.

8.1.1 Affected Drawings and Documentation

At the start of a design activity/project, searches for affected drawings and documentation related to the proposed work need to be conducted. This includes searching the updated quarterly reports at SDDC in Building 130 (also see AMN-101) and researching available lessons learned from previous Work Packages.

8.1.2 Walkdown

All areas affected by a work activity/project must be walked down. Walkdowns are performed by appropriate engineering, planning, craft, safety and operations personnel to ensure that the understanding of the technical scope is accurate.

8.1.3 Engineering Design Package Screen

The Engineering Design Package Screen form is a graded approach screen used to determine the amount of documentation and review required for the EDP (see Appendix 2, Form 1).

An EDP that passes the screen is referred to as an Engineering Support Process (ESP) and is developed using the ESP format. If an EDP fails the screen, or if the designer elects not to use the screen, the Regular Design Package (RDP) format must be used. EDPs that involve master drawings are automatically developed as an RDP.

8.1.4 Temporary Modifications Requiring Design

Temporary modifications requiring design **SHALL** be developed in accordance with the design process in this document. Information on temporary modifications (TMs), including how to obtain a TM number, is located in MAN-066-COOP, *Site Conduct of Operations Manual* (COOP).

8.1.5 Design Package Requirements and Contents

Refer to the following:

- Table 1, ESP Requirements and Contents
- Table 2, RDP Requirements and Contents.

Table 1, ESP Requirements and Contents

Engineering Design Package Graded Approach	Reviews and Concurrence	Final Approval (Release Package To SDDC)	Package Contents (See Note 1)	In Review Package (See Note 2)	In Final Release Package to SDDC (Originals Prior to Construction) (See Note 2)	In Final Record (Package After Closeout) (See Note 2)
ESP - Passed EDP Screen The ESP requires minimal documentation and no formal review unless required by the design team.	• Radiological Engineer (if required by ALARA screen) • Design Checker • Classifier	• Responsible Engineering Manager	Type 2 Work Package Cover Sheet (IWCP)	X	X	X
			Engineering Order (AMN-101)	X	X	X
			Table of Contents	X	X	X
			Work Control Form (IWCP)	X	X	X
			Engineering Design Package Screen (Form 1)	X	X	X
			Design Scope and Analysis (Form 2)	If used	If used	If used
			ALARA Design Review Screen (Form 3)	X	X	X
			Calculation forms, Optional (Forms 4, 4A, and 4B)	If used	If used	If used
			Bill of Material (Form 5)	If used	If used	If used
			Design Work Special Instructions (Form 6)	If used	If used	If used
			Baseline Document Change Form (Form 7)	NA	NA	NA
			Review Comment Sheets (Form 8)	If used	If used	If used
			Continuation Page (Form 9) used as applicable for additional documentation such as PMTs , special tools/personnel protective equipment OR for adding information to an existing form (attach to associated form).	If used	If used	If used
			Clarification sketches, photographs, or drawings.	If used	If used	If used
NOTES: 1) Additional requirements may apply, see IWCP. 2) X = Required in package			Required Appendices (IWCP) Other documentation important to the development of the design package (for example, JHA, NSE, or ISR)	If used	If used	If used

Table 2, RDP Requirements and Contents

Engineering Design Package Graded Approach	Reviews and Concurrence	Final Approval (Release Original Package To SDDC)	Package Contents (See Note 1)	In Review Package (See Note 2)	In Final Release Package to SDDC (Original Prior to Construction) (See Note 2)	In Final Record (Package After Closeout) (See Note 2)
RDP - Failed EDP Screen The RDP requires design documentation, reviews, and approvals. **NOTES:** 1) Additional requirements may apply, see IWCP. 2) X = Required in package	• Landlord (Verification that notified about EDP) • Design Checker • Independent Verifier, if required • Radiological Engineer (if required by ALARA screen) • Other reviews required and/or deemed necessary • Special reviews or evaluations (such as NSE or ISR) as applicable • Classifier	▫ Responsible Engineering Manager	Work Package Cover Sheet (IWCP)	X	X	X
			Engineering Order (AMN-101)	X	X	X
			Table of Contents	X	X	X
			Work Control Form (IWCP)	X	X	X
			Engineering Design Package Screen (Form 1)	If used	If used	If used
			Design Scope and Analysis (Form 2)	X	X	X
			ALARA Design Review Screen (Form 3)	X	X	X
			Calculation forms, Optional (Forms 4, 4A, and 4B)	If used	If used	If used
			Bill of Material (Form 5)	If used	If used	If used
			Design Work Special Instructions (Form 6)	X	X	X
			Baseline Document Change Form (Form 7)	X	X	X
			Review Comment Sheets (Form 8)	Blank Form	Comments resolved and concurrence	Comments resolved and concurrence
			Continuation Page (Form 9) used as applicable for additional documentation such as PMTs , special tools/personnel protective equipment OR for adding information to an existing form (attach to associated form).	If used	If used	If used
			Master drawings, excerpts, sketches, or photographs	X	X	X
			Required Appendices (IWCP) Other documentation important to the development of the design package (for example, JHA, NSE, or ISR)	X	X	X

8.2 TASK 2 Prepare Design Input

This task results in the systematic development of the purpose, scope, functional requirements, system parameters, regulations, codes and standards, or other design requirements that govern the scope and engineering design bases of an EDP.

8.2.1 Design/Planning Scope and Analysis

The Design Scope and Analysis form is used to describe the problem and solution (see Appendix 2, Form 2).

8.2.2 Interfacing Disciplines

For support in preparation of design input, appropriate interfacing disciplines need to be determined. The Job Hazard Analysis Checklist can be used as a tool in determining interfacing disciplines (see IWCP, Appendix 3.2). The following are examples of interfacing disciplines to consider:

INTERFACING DISCIPLINES	
• Architectural	• Fire Protection Engineering
• Biology	• Heating, Ventilation, and Air Conditioning (HVAC)
• Chemical Engineering	• Hydrology
• Chemistry	• Industrial Hygiene
• Civil Engineering	• Mechanical Engineering
• Construction Engineering	• Nuclear Engineering
• Criticality Engineering	• Radiological Engineering
• Ecology and Watershed Sciences	• Safeguards and Security Engineering
• Electrical Engineering	• Structural and Stress Mechanics
• Environmental Engineering/Science	

Although several safety program interfaces such as the ALARA review are specified in this procedure, the Designer is responsible for integrating the design process with other safety programs that have unique design interface requirements. Examples of Site safety program interfaces to consider are:

- Fire Protection
- Nuclear Criticality Safety
- Radiological Control
- WIPP

8.2.3 Natural Phenomena Hazards Determination

Site SSCs are evaluated in accordance with Engineering Standard SC-206. The evaluations assist the engineer in determining the appropriate Natural Phenomena Hazard (NPH) Performance Category requirements for Procurement Level and pre-operational instrument calibration requirements in accordance with Appendix 1.

8.3 TASK 3 Complete Design Output Documents

Design Output Documents provide the technical justification necessary for EDP approval. All aspects of the designing/planning process are to be considered when deciding what Design Output Documents are applicable such as drawings, calculations, design specifications, and post-maintenance tests (PMTs).

8.3.1 Drawings

Drawings are to be prepared in accordance with AMN-101 and Site Engineering Standard SX-300.

8.3.2 ALARA Design Review Screen

An ALARA Design Review Screen is completed for all EDPs (see Appendix 2, Form 3). Radiological Engineering is to be contacted if the results of the ALARA Design Review Screen indicate the need to complete an ALARA Design Review. (Also see the Site *Radiological Control Manual.*)

Additional requirements should be specified if the design involves fissionable material operations (see 1-MAN-018-NSM, *Nuclear Safety Manual).*. The comments section of the ALARA Design Review Screen (Form 3) is used to document this information.

8.3.3 Calculations

All calculations are documented on the forms provided in this procedure (see Appendix 2):

- Calculation/Technical Basis Cover Sheet and Revision Summary (Form 4)
- Calculation/Technical Basis Sheet (Form 4A)
- Calculation Sheet (Form 4B)

Power Load Calculation

Existing power load calculations may be revised. When power load data is not available, power load calculations should be performed to demonstrate that the circuit breakers, emergency generator capacities, and power factors are not adversely affected.

Special company generated formats can be used for load calculations (for example, subcontractor develops a company-specific power modification request form). The engineer responsible for the calculation signs the calculation form as the Designer.

Computer Software Calculation

When the EDP includes computer software installation or modification, the following is submitted with the final EDP:

- Documentation identifying the computer software program including the version and the changes
- One copy of the Calculation/Technical Basis Sheet (Appendix 2, Form 4A)

8.3.4 Instrumentation Calibration

When instrumentation is installed, removed, or modified, it must be calibrated to building specifications before it is placed into operation. The appropriate instrument calibration tracking system must be updated. The calibration should be documented by a calculation, if applicable. If instructions for calibration are not provided by the Metrology lab, instructions must be provided on the Design Work Special Instructions (Appendix 2, Form 6).

8.3.5 Construction Specifications

All construction specifications **SHALL** be prepared using Construction Specifications Institute (CSI) format with emphasis placed on work instructions and hazards analysis.

8.3.6 Bill of Material

A bill of material (BOM) can be completed on either the Bill of Material form (see Appendix 2, Form 5) or a drawing. (Also see Chapter 4 of the IWCP.)

Bill of materials for Design/Build or Design-Bid-Build projects may be prepared by the contractor utilizing their format with the approval of the Project Manager.

8.3.7 Tests and Inspections

Test and inspection instructions are completed in Section 6 of the Design Work Special Instructions form (Form 6). (Also see the SERM, Section 5.8, Inspection and Acceptance Testing.)

8.3.8 Design Work Special Instructions

The Design Work Special Instructions form is used to facilitate work planning for nonroutine or complex design (Appendix 2, Form 6). Information for developing the work instructions is also located in Chapter 5, Section 3.2.2 of the IWCP. Additionally, any deviation from industry or Site Engineering standards is documented on this form.

8.4 TASK 4 Prepare Engineering Design Package for Final Release

This task results in preparing the EDP for final release which includes drawing updates, package assembly, reviews, comment resolution/concurrence, and final approval.

8.4.1 Baseline Document Change Form

The Baseline Document Change Form (BDCF) is used to identify controlled documents that need to be changed as a result of design changes [for example, drawings; procedures; Preventive Maintenance Orders (PMOs); and System Evaluation Reports (SERs)]. (See Appendix 2, Form 7.)

A BDCF is used when voiding master drawings, specifications, engineering calculations, and other documents for SSCs that no longer exist.

Checking the "PHASED CLOSEOUT" box on the BDCF indicates that drawings are to be, or have been, closed-out in parts (or phases) prior to submitting the package for final closeout (also see Section 8.7.1).

8.4.2 Engineering Design Package/IWCP Type 2 Work Package Assembly

Engineering Design Package Assembly

All EDP forms and associated documentation are assembled, as applicable, in the order shown in Table 1 or 2 (see Section 8.1.5). Additional documentation can be included as an EDP appendix.

Section headings in the EDP Table of Contents (TOC) correspond to the forms used in the package (also see Table 1 and 2) and are arranged in the order of the form numbers. The total number of drawings and pages in the package is indicated on the TOC.

IWCP Type 2 Work Package Assembly

The EDP is a section of the IWCP Type 2 Work Package and is listed in the TOC. The IWCP Type 2 Work Package is assembled in the order shown in Figure 1 (see Section 2.1).

8.4.3 Package Reviews

EDPs that have a one-year or greater shelf life starting from the date of Responsible Engineering Manager approval require the following before release:

- Review by the same functional organizations that reviewed the original
- Approval by the Responsible Engineering Manager

If more than one person from an organization reviews the EDP, the individual who was identified as the EDP reviewer must consolidate all comments prior to returning the package to the originator. This individual is responsible for signing final concurrence on the Review Comment Sheet.

ESP (Minimal Package) Reviews

An ESP requires a check by a Design Checker; however, it does not require a formal package review. Radiological Engineering must be contacted if the results of the ALARA Design Review Screen indicate the need to complete an ALARA Design Review. (See Section 8.4.6 for final ESP package approval.)

RDP Reviews

Review by a Design Checker and, if applicable, an Independent Verifier or Radiological Engineer is required for all RDPs (see Sections 7.3, 7.4 and 8.3.2). Other reviews as required on the EO are submitted to the appropriate organizations (see AMN-101, Appendix 1). Additional reviews may be obtained, as determined by the designer.

All RDPs are distributed for review with an attached Review Comment Sheet (Appendix 2, Form 8). A request can be made for SDDC to copy and distribute packages to reviewers by submitting the package to SDDC with an EO.

8.4.4 Comment Resolution and Concurrence

All EDP reviewer's comments submitted on the Review Comment Sheet(s) are to be resolved and concurrence signatures obtained. In addition, EDP review comments submitted from an oversight organization that was not specifically identified as a reviewer are to be resolved and concurred. Unresolved comments are elevated to the Responsible Engineering Manager for resolution.

8.4.5 Special Reviews and Evaluations

A Nuclear Safety Evaluation and an Independent Safety Review determination **SHALL** be performed on all RDPs in accordance with the Site requirements documents and implementing procedures identified in Appendix 1. Any documentation associated with Nuclear Safety Evaluations and Independent Safety Reviews must be included as an appendix to the RDP. (Also see IWCP for Type 2 and Type 3 Work Packages.)

8.4.6 Final Engineering Design Package Approval

All final EDP review signatures *except* the Responsible Engineering Manager are to be obtained and entered on an EO in accordance with the instructions (see AMN-101, Appendix 1). (Also see IWCP Chapter 5 for Work Package Cover Sheet signature requirements.)

Prior to final approval, the EDP is assembled and incorporated as a separate section into the IWCP Type 2 Work Package. Instructions for assembling the IWCP Type 2 Work package are located in Section 8.4.2 of this procedure.

The Responsible Engineering Manager signs the EO as approval that the EDP is complete and approved for release to SDDC.

8.5 TASK 5 Release IWCP Type 2 Work Package

This task results in the final release of the IWCP Type 2 Work Package.

An Authorized Derivative Classifier reviews the IWCP Type 2 Work Package prior to final release and signs the EO to verify the package has been classified.

The original IWCP Type 2 Work Package is submitted to SDDC with the EO (also see Section 8.4.6). SDDC retains the IWCP Type 2 Work Package in accordance with AMN-101. SDDC issues copies of the IWCP Type 2 Work Package in accordance with the EO and AMN-101.

8.6 TASK 6 Complete Post-Release Requirements

This task provides requirements for changing a final-released EDP.

8.6.1 Engineering Change Requests

An ECR is a change to an IWCP Type 2 or Type 3 Work Package that has been final-released. Type 2 and Type 3 ECRs are for design changes and must meet the requirements of Section 8.1. There are three types of ECRs as shown in Table 3, Processing Engineering Change Requests.

Table 3, Processing Engineering Change Requests

TYPE	SCOPE OF CHANGE	REVIEWED BY	DOCUMENTATION REQUIREMENTS
1	**Administrative clarification or corrections** (for example, typographical errors, spelling errors)	Designer or Construction Manager (Telecom concurrence from the Designer is permitted for Authorization Projects only).	Cloud, initial, and date affected area in redline drawing/package.
2	**Minor design change.** Any change that does <u>not</u> affect design basis or scope.	See DES-210, Tables 1 and 2.	* Submit ECR original to SDDC if the ECR adds documents to or deletes documents from the BDCF. Complete EO and check Engineering Change Request box on form.
3	**Full ECR.** Any change in design basis or scope.	See DES-210, Tables 1 and 2.	* Submit ECR original to SDDC if the ECR adds documents to or deletes documents from the BDCF. Complete EO and check Engineering Change Request box on form.

* ECR Types 2 and 3 **SHALL** be submitted to SDDC prior to activity/project closeout *only* if the following criteria apply:

1. After EDP is originally released to SDDC and prior to being released for the construction phase
2. During construction phase if documents have been added to or deleted from the BDCF

Engineering Change Request Special Reviews

See Section 8.4.5 of this document and the IWCP.

Final Approval of the Engineering Change Request

The Responsible Engineering Manager signs the EO to verify that the ECR is complete and approved. To prepare an ECR for final approval, see Section 8.4.6.

Final Release of the Engineering Change Request

An Authorized Derivative Classifier reviews the ECR and signs the EO to verify the ECR has been classified.

If criteria defined in Table 3 (see *) exists, the original ECR is submitted to SDDC in Building 130. SDDC maintains the ECR in accordance with AMN-101.

8.6.2 Redlined Documents and Drawings

Documents used during the project work activities are to be redlined as changes occur. Redline comments are incorporated into the master document prior to work activity/project closeout. A walkdown may be necessary to verify redlined drawings.

If master drawings are to be voided at closeout, redline comments do not need to be incorporated into the master but they must be retained during the construction work activity.

If the activity/project is cancelled prior to completion of the work:

- A master drawing must be revised to reflect the field changes that occurred up to that point
- An approved drawing must be made into a master drawing that reflects field changes that occurred.

8.7 TASK 7 Closeout and Cancellation

This task provides requirements for closeout of an IWCP Type 2 and Type 3 Work Package and for cancellation of an activity/project.

8.7.1 Phased Closeout

The EDP can be closed out in parts (or phases) prior to submitting the IWCP Type 2 Work Package for final closeout. This is termed a "phased closeout." (Also see the BDCF, Appendix 2, Form 7)

8.7.2 Closeout of IWCP Type 2 and Type 3 Work Packages

The IWCP Type 2 Work Package is closed out per IWCP, Chapter 5, Section 3.8. Closeout of an IWCP Type 3 Work Package is in accordance with IWCP, Chapter 6.

SDDC retains all original design/planning records associated with the IWCP Type 2 Work Package until closeout is complete. Once closeout is complete, SDDC forwards a copy of the EDP to the building where the work activity/project is to be performed and submits the package files to Records Management for disposition. All as-builts are to be completed prior to activity/project closeout.

8.7.3 As-built Documents and Drawings

Changes indicated by redlined documents and drawings **SHALL** be incorporated into document and drawing masters, unless the masters are voided, to create as-built documents and drawings reflecting the actual closeout conditions of the activity/project. All as-builts are completed prior to activity/project closeout. Also see AMN-101 and Engineering Standard SX-300.

8.7.4 Cancellation of Activity/Project

If the activity/project is cancelled, all documentation is as-built to reflect the final status of the activity/project (see Section 8.7.3). Also see IWCP, Chapter 5, Section 3.7.

9. RECORDS

9.1 Engineering Design Package Forms

All EDP forms initiated as a result of this procedure should be completed in a legible and indelible medium and are considered quality documents.

Electronic copies of all forms in this procedure are on the Site's Intranet Engineering organization web page. Hardcopy forms in this procedure can be obtained from SDDC.

9.2 Non-Quality Assurance Records

No Non-Quality Assurance Records are generated by this procedure.

9.3 Quality Assurance Documents

Quality documents and drawings generated by the performance of this procedure are managed in accordance with 1-V41-RM-001, *Records Management Guidance for Records Sources*.

All design/planning records associated with the final EDP/IWCP Type 2 or Type 3 Work Package are released to SDDC for interim storage until the closure process is complete.

Design documents and drawings generated for products used at WIPP are also managed in accordance with 1-MAN-008-WM-001.

9.4 Active Records

Active records necessary to conduct engineering business are maintained and stored by Site Design Document Control in accordance with 1-V41-RM-001. These records include but are <u>not</u> limited to drawings, new design, and construction.

10. REFERENCES

DOE Order 5480.20A, *Personnel Selection, Qualification and Training Requirements for DOE Nuclear Facilities*

DOE Order 6430.1A, *General Design Criteria*

DOE M 440.1-1, *DOE Explosives Safety Manual*

DOE Standard 1020-94, *Natural Phenomena Hazards Design and Evaluation criteria for DOE Facilities*

DOE Standard 1021-93, *Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components*

DOE/TIC-11268, *A Manual for the Prediction of Blast and Fragment Loading of Structures*

Engineering Standard SC-206, *Natural Phenomena Hazard Analysis of Structures, Systems, and Components*

Engineering Standard SX-300, *General Drafting Standards*

HSP 13.01, *Control of Pesticides*

HSP 13.03, *Carcinogen Control*

HSP 13.05, *Toxic Chemical Control*

MAN-027-SERM, *Site Engineering Requirements Manual*

MAN-066-COOP, *Site Conduct of Operations Manual*

MAN-071-IWCP, *Integrated Work Control Program Manual*

Radiological Control Manual

Site Quality Assurance Manual

Site *Safety Analysis Report*

TM5-1300, *Structures to Resist the Effects of Accidental Explosions*

1-C10-NSM-04.03, *Safety Evaluation Screen*

1-C11-NSM-04.05, *Unreviewed Safety Question Determination*

1-MAN-008-WM-001, *Transuranic (TRU) Waste Management Manual*

1-MAN-018-NSM, *Nuclear Safety Manual*

1-V41-RM-001, *Records Management Guidance for Records Sources*

1-W56-COEM-AMN-101, *Site Design Document Control*

1-15310-HSP-13.04, *Beryllium Protection*

1-52000-ADM-02.01, *Operations Review Requirements*

2-C93-COEM-DES-273, *Engineering Standards for Procurement*

29 CFR 1910.119, *Process Safety Management of Highly Hazardous Chemicals*

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APPENDIX 1

Page 1 of 2

STRUCTURES, SYSTEMS, AND COMPONENTS CATEGORIES

In lieu of this table, the Building-specific authorization basis (or the Building SERs) is used to determine Systems Category (Column 2) and Natural Phenomena Hazards (NPH) Performance Criteria (Column 6), if available. If the information is not available, answering the questions in Column 1 and correlating with Column 2 will determine the Systems Category of Site SSCs. Once the Systems Category is determined, other requirements for the contents, preparation, review, and approval of an ESP or RDP and associated documentation can be identified using Columns 3 through 8 (also see Page 2 of this appendix).

1 Question	2 Systems Category	3 Engineering Package Type	4 Independent Safety Review	5 Nuclear Safety Evaluation	6 NPH Performance Criteria	7 Procurement Level	8 Instrument Calibration Required
Does the SSC provide a building with credited Safety SSC functions identified in Authorization Basis Documents (such as FSAR, BIO)? OR	1/2 Safety SSCs	RDP required	See Footnote 1	See Footnote 1	See Footnote 2&3	PL1 Or PL2 (Per DES-273)	YES (For monitoring LCO compliance)
Does this SSC provide direct support to an SSC (defined in a Safety SSC System Evaluation Report) and would its failure prevent the SSC from providing its function?							
Does the SSC provide regulator required radiological, toxicological, or high energy protection for workers?	3 Facility Safety Systems (FSSs)	ESP Or RDP required (based on results of EDP screen)					As determined for maintaining safe operations and regulatory compliance. or As requested by Operations or Engineering to support "Good Practice" or permanent Plant Instruments.
None of the Above	4 Not Safety Class	Complete ESP or RDP based on EDP Screen				PL3 (Per DES-273)	Optional

1 See 1-MAN-018-NSM and 1-52000-ADM-02.01, *Operations Review Requirements* to determine Nuclear Safety Evaluation and Independent Safety Review requirements.

2 In accordance with Site Engineering Standard SC-206 and DOE Standard 1021-93, *Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components.*

3 Wind and seismic load requirements are defined in DOE Standard 1020-94, *Natural Phenomena Hazards Design and Evaluation Criteria for DOE Facilities.* Also use Site Engineering Standard SC-206 for guidance in determining seismic qualification.

APPENDIX 1
Page 2 of 2

The following information is provided to assist in determining additional EDP contents, preparation, review, and approval requirements:

Engineering Package Type (Column 3)

For System Category 1/2 SSCs, an RDP is required. Table 2 in Section 8.1.5 defines the minimum contents, reviews, and approvals for each package type.

For System Category 3 and System Category 4 SSCs, either an ESP or RDP is used. This determination is based on the results of the EDP Screen (Appendix 2, Form 1). (Also see Table 1 and 2 in Section 8.1.5 for package contents reviews, and approvals.)

Independent Safety Review (Column 4)

See 1-52000-ADM-02.01, *Operations Review Requirements* to determine Independent Safety Review requirements.

Nuclear Safety Evaluation (Column 5)

See 1-MAN-018-NSM, *Nuclear Safety Manual* to determine Nuclear Safety Evaluation requirements and, as applicable, see 1-C10-NSM-04.03, *Safety Evaluation Screen*, 1-C11-NSM-04.05, *Unreviewed Safety Question Determination*, or company-level equivalent.

Natural Phenomena Hazards Performance Category (Column 6)

See Site Engineering Standard SC-206, *Natural Phenomena Hazard Analysis of Structures, Systems, and Components* and DOE Standard 1021-93, *Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components*.

Procurement Level (Column 7)

See 2-C93-COEM-DES-273, *Engineering Standards for Procurement.*

Operational Calibration Requirements (Column 8)

All process control instruments should be calibrated by a metrology lab traceable to National Institute of Standards and Technology if they meet the attributes stated in Column 8.

APPENDIX 2 - FORM 1

ENGINEERING DESIGN PACKAGE SCREEN

RFETS ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

FORM 1 (1-V51-COEM-DES-210)

Engineering Design Package Screen

1. IWCP/Authorization Project Number	12. Modification Description Title	3. Page of

Section 1: EDP SCREEN INSTRUCTIONS

Review Section 2 and Section 3 to determine if the ESP, requiring minimum documentation, can be used. An ESP can be used if (1) a pre-approved condition exists in Section 2 AND (2) NO exclusion condition exists in Section 3.

Section 2: Pre-Approved Conditions (Check if applicable.)

- ☐ Signs smaller than 6 by 8 feet
- ☐ Sidewalks
- ☐ Painting/Stenciling guidance
- ☐ Technical guidance for digging trenches or ditches
- ☐ Lawn sprinkler system, downstream of back flow preventer
- ☐ Installation of "Tuff Sheds" or equivalent with or without pads
- ☐ Concrete pads intended to support loads less than 50 lbs/ft2
- ☐ Technical guidance for movement of 120 Volt circuits protected by existing circuit breakers (increase or decrease in power load is not applicable)
- ☐ Brackets for hanging items weighing less than 50 pounds
- ☐ Technical guidance for rework that does not modify the system
- ☐ Nonsecurity fences
- ☐ Temporary wood/metal stairs
- ☐ Weather shielding guards
- ☐ Machinery/Equipment guards

Section 3: Exclusion Screen (Check if applicable.)

An ESP cannot be used for work involving any of the conditions listed in this section.

Affects System Category (see Appendix 1) including:

- ☐ Modifies hardware and software or requires a change in System Category 1/2
- ☐ Impacts a System Category 1/2 or those SSC that support Category 1/2 during installation, modification, or rework
- ☐ Modification requires a change or impacts any Crticality Safety Operating Limit, Nucelar Material Safety Limit, or hardware
- ☐ Impacts any SSC for which credit is taken in an Operational Safety Operating Limit or Nuclear Material Safety Limit
- ☐ Impacts any SSC for which credit is taken in an Technical Safety Requirement/Operation Safety Requirement (TSR/OSR) or Basis for Interim Operation (BIO)
- ☐ Creates an out-of-tolerance with respect to a Safety Analysis Report (SAR), TSR/ OSR, Basis for Operation (BFO), BIO, Limiting Condition of Operation (LCO), System Evaluation Report (SER), or Engineering Operability Evaluation (EOE)
- ☐ Safeguards and Security Systems
- ☐ Design Output Documents located in Site Design Document Control, Building 130, unless associated with a pre-approved condition listed in Section 2 of this screen. EDPs that require use of master drawings are always RDPs.

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APPENDIX 2

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APPENDIX 2 - FORM 2

DESIGN SCOPE AND ANALYSIS

RFETS ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

FORM 2 (1-V51-COEM-DES-210)

Design Scope and Analysis

Section 1: PURPOSE AND WORK IDENTIFICATION	
1. IWCP/Authorization Project Number	2. Page of
3. Modification Description Title	4. Date

Section 2: PROBLEM DESCRIPTION AND SOLUTION

5. Problem Description (Purpose, Scope, Assumptions, Design Inputs)

6. Problem Solution, Design Analysis

7. Impacts to authorization basis documentation (for example, SAR, TSR/OSR, BFO, BIO, LCO, SER, or EOE) ☐ None

(01/99)

APPENDIX 2 - FORM 2

DESIGN SCOPE AND ANALYSIS FORM COMPLETION INSTRUCTIONS

Note 1: *If a block is not applicable, enter N/A.*
Note 2: *Use the Continuation Sheet (Form 9) if more room is needed to complete any block on this form.*

Block	Instructions
Section 1: FORM PURPOSE, WORK IDENTIFICATION, AND SSC CLASSIFICATION	
1	Enter IWCP or Authorization Project Number.
2	Enter package page count prior to release for implementation.
3	Enter Modification Description Title.
4	Enter date.
Section 2: PROBLEM DESCRIPTION AND SOLUTION	
5	Enter detailed problem statement.
6	Enter problem solution, design analysis.
7	Identify impacts of design on authorization basis documentation (for example, SAR, TSR/OSR, BFO, BIO, LCO, SER, or EOE) and provide a description of impacts. If none, check box "None."

APPENDIX 2 - FORM 3

ALARA DESIGN REVIEW SCREEN

RFETS ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

FORM 3 (1-V51-COEM-DES-210)

ALARA Design Review Screen

Section 1: DESIGN PACKAGE IDENTIFICATION

Complete the ALARA Design Review Screen and Blocks 1 – 6. Retain the ALARA Design Review Screen in the Engineering Design Package to verify the screen was performed.

If the answer is "Yes" to any of the statements below, the Engineering Design Package will be forwarded to Radiological Engineering for review/concurrence.

Is the proposed work for new installation, modification, relocation, or removal of:

- A radioactively contaminated system or piece of equipment? ☐ Yes ☐ No
- A radioactive material processing line? ☐ Yes ☐ No
- Permanent radiation shielding? ☐ Yes ☐ No
- Major structures or equipment for radioactive material storage? ☐ Yes ☐ No
- Major structures, walls, or equipment inside radiological areas? ☐ Yes ☐ No
- Other engineering changes of radiological significance? (Explain) ☐ Yes ☐ No

1. IWCP/Authorization Project Number	2. Design Description Title	3. Page of
4. ECR Number		5. Building Number

6. Additional Comments

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APPENDIX 2

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APPENDIX 2 – FORM 4

CALCULATION / TECHNICAL BASIS COVER SHEET AND REVISION SUMMARY

RFETS ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

FORM 4 (1-V51-COEM-DES-210)

Calculation / Technical Basis Cover Sheet and Revision Summary

Section 1: IDENTIFICATION

1. IWCP/Authorization Project Number	2. Modification Description Title		3. Page of
4. Use of Form ☐ Calculation ☐ Engineering Analysis ☐ Software Installation or Change ☐ Technical Basis	5. Job Title		
6. Calculation Number/Assigned Document Control No.	7. Affected Building Nos.	8. Room	9. Floor
10. System ID	11. System Category ☐ 1/2 ☐ 3 ☐ 4	12. Natural Phenomena Category (PC) ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ N/A	

Section 2: PREPARATION, REVIEW AND APPROVAL

13. Rev. No.		14. Designer/ Date	15. Design Checker(s)/ Date	16. Independent Verifier(s)/Date	17. Responsible Engineering Manager/Date	18. Landlord	19. Supersedes Calc. No. or Rev. No.	20. Field Confirm. Required (✓)
	Print Name Sign Date							☐ Yes ☐ No
	Print Name Sign Date							☐ Yes ☐ No
	Print Name Sign Date							☐ Yes ☐ No

Section 3: REVISION SUMMARY

21. Rev. No.	22. Description/Reason for Revision	23. Affected Pages

(01/99)

APPENDIX 2 - FORM 4

CALCULATION / TECHNICAL BASIS COVER SHEET AND REVISION SUMMARY FORM COMPLETION INSTRUCTIONS

Note 1: *If a block is not applicable, enter N/A.*
Note 2: *Use the Continuation Sheet (Form 9) if more room is needed to complete any block on this form.*
Note 3: *Complete an Engineering Order form (AMN-101, Appendix 1) to issue a Calculation/Technical Basis and submit to Site Design Document Control, Building 130.*
Note 4: *If this form is developed for use external to the design process and classification/UCNI review is required, then ensure the document is reviewed by an Authorized Derivative Classifier in accordance with DOE Order 5650.2B, The Classification Information and DOE Order C471.1, Identification and Protection of Unclassified Controlled Nuclear Information.*
Note 5: *If the calculation requires more than three revisions, then start a new form and include all forms in the designated package file.*

FORM USE	BLOCKS REQUIRED TO BE COMPLETED BASED ON FORM USE
Calculation	All
Technical Basis	All except 18 and 19
Engineering Analysis	All except 18 and 19
Software Installation or Change	1-11, 13-18, 21-23

Block **Instructions**

Section 1: IDENTIFICATION

1 Enter the IWCP or Authorization Project Number.
2 Enter the Modification Description Title.
3 Enter package page count prior to release for implementation.
4 Check the appropriate box to identify purpose of form.
5 Enter job title.
6 Enter the calculation number/assigned control number obtained from Site Design Document Control prior to release of final package or Calculation/Technical Basis/Engineering Analysis/Walkdown.
7 Enter Building or Area number for all affected buildings or areas.
8 Enter the room number.
9 Enter the floor and/or elevation.
10 Enter System identification number obtained from SX-164, Standard for Plant System and Component Identification and Labeling.
11 Check the appropriate System Category box based on Appendix 1, System, Structures, and Component Classification determination.
12 Enter the Natural Phenomena Hazard Performance Category based on Appendix 1, System, Structures, and Component Classification determination. If the EDP does not affect SSC, check box "0."

Section 2: PREPARATION, REVIEW, AND APPROVAL

13 Enter revision number.
14 Designer - Print name, sign, and date indicating that the contents of the forms are complete and technically accurate.
15 Design Checker - Print name, sign, and date indicating that the contents of the forms are technically accurate.
16 Independent Verifier - (Required for System Category 1/2, or PC 2 or 3) Print name, sign, and date indicating that contents of the forms are complete and technically accurate. (Independent Verifier must be different person than the Design Checker).
17 Responsible Engineering Manager - Print name, sign, and date indicating that the appropriate technical reviews have been completed by qualified individuals and all comments have been dispositioned appropriately.
18 Landlord - Print name, sign, and date indicating that the major subcontractor representative responsible for the facility/infrastructure/SSC operation is cognizant of the design for which the design package is applicable. Landlord signature is not required if the design documents were produced by the landlord company.
19 Enter number of calculation superseded.
20 If the calculation must be verified in the field, check "Yes" box and record post-installation test requirements on Design Work Special Instructions (Form 6).

Section 3: REVISION SUMMARY

21 Enter revision number.
22 Describe nature of revision.
23 List affected pages

APPENDIX 2- FORM 4A

CALCULATION / TECHNICAL BASIS SHEET

RFETS ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

FORM 4A (1-V51-COEM-DES-210)

Calculation / Technical Basis Sheet

Section 1: IDENTIFICATION		
1. IWCP/Authorization Project Number	2. Modification Description Title	3. Page of
4. Calculation Number/Assigned Control Number		5. Rev. No.

Section 2: OBJECTIVE, METHODS, ASSUMPTIONS, REFERENCES, AND CONCLUSION

6. Objective (Both Functional and Structural Requirements)

7. Method

8. Assumptions and Technical Basis

9. Design Inputs/ References

9A. Ref. No.	9B. Inputs/References (with Revision and/or Date or Source)

10. Conclusions

(01/99)

APPENDIX 2 - FORM 4A

CALCULATION / TECHNICAL BASIS SHEET FORM COMPLETION INSTRUCTIONS

Note 1: *If a block is not applicable, enter N/A.*
Note 2: *Use the Continuation Sheet (Form 9) if more room is needed to complete any block on this form.*
Note 3: *If more than 10 attachments are included with this form or if attachments are voluminous, an index of attachments should be included.*

FORM USE	BLOCKS REQUIRED TO BE COMPLETED BASED ON FORM USE
Calculation	All
Technical Basis	All
Engineering Analysis	All
Software Installation or Change	1-6, 9 (A and B), and 10

Block **Instructions**

Section 1: IDENTIFICATION

1 Enter the IWCP or Authorization Project Number
2 Enter the Modification Description Title.
3 Enter the package page count prior to release for implementation
4 Enter the calculation number/assigned control number obtained from Site Design Document Control
5 Enter the revision number.

Section 2: OBJECTIVE, METHODS, ASSUMPTIONS, REFERENCES, AND CONCLUSIONS

6 List objectives. Provide a brief description of the purpose and problem which will be resolved.
7 Summarize the method or techniques indicating how the inputs, references, and assumptions were used to achieve the objectives (for example, computer program, hand calculation, comparison).
8 List assumptions used. Document the technical basis when engineering judgment is used to support the assumptions.
9A Sequentially number and reference input data such that the source and/or documents are readily identifiable.
9B Identify all documents used (for example, Regulatory Guides, Industry Codes and Standards, vendor information). Identify the particular part of included reference material that applies.
10 After completion, delineate whether the objective was attained.

APPENDIX 2- FORM 4B

CALCULATION SHEET

RFETS ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

FORM 4B (1-V51-COEM-DES-210)

Calculation Sheet

Section 1: CALCULATION IDENTIFICATION			
1. Calculation Number	2. Revision Number	3. IWCP/Authorization Project Number	4. Page of
5. Modification Description/Title		6. Designer (Print Name)	
		7. Design Checker (Print Name)	

Section 2: CALCULATION

(01/99)

APPENDIX 2 - FORM 4B

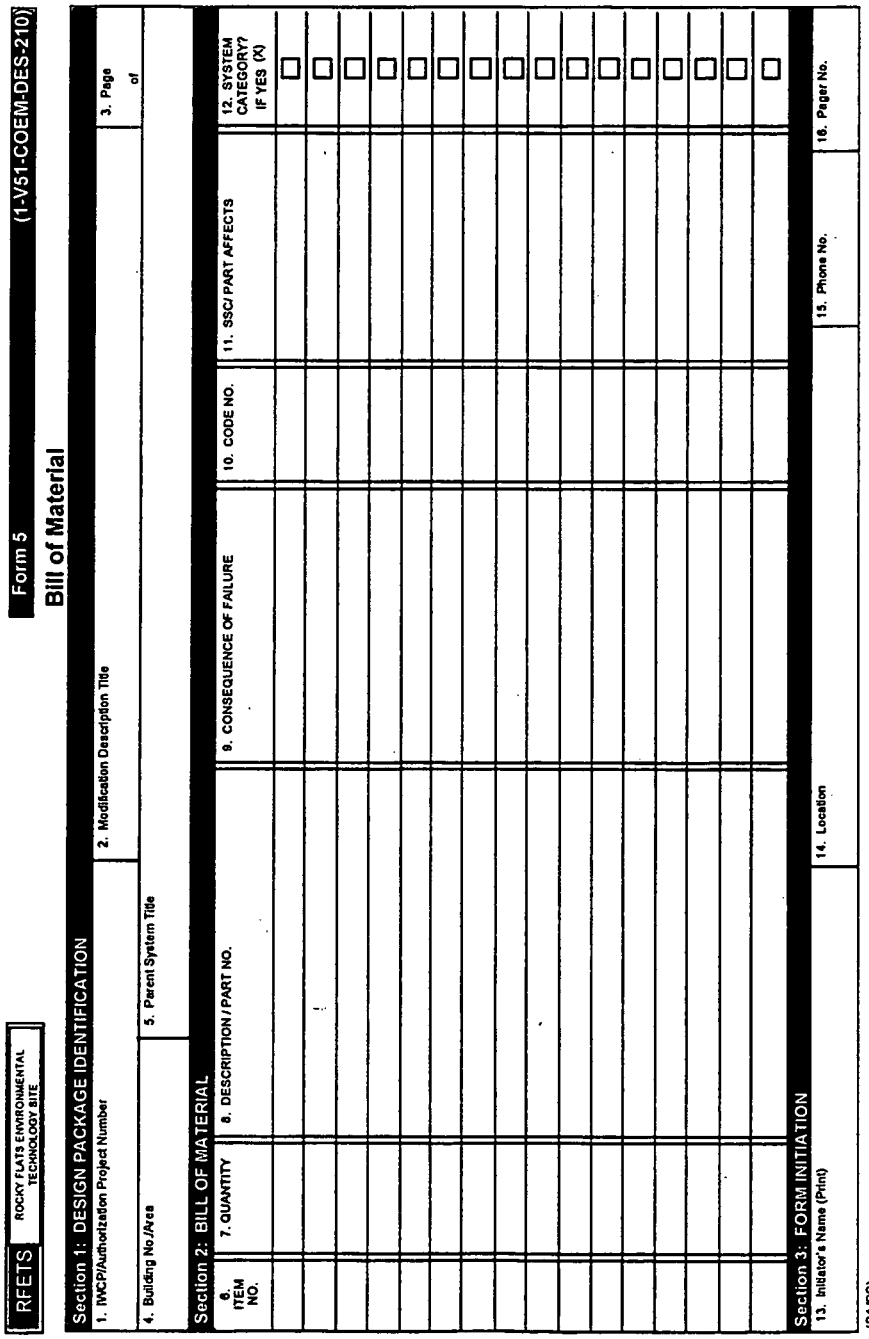
CALCULATION SHEET
FORM COMPLETION INSTRUCTIONS

Note 1: *If a block is not applicable, enter N/A.*
Note 2: *Use the Continuation Sheet (Form 9) if more room is needed to complete any block on this form.*

Block	Instructions
Section 1: IDENTIFICATION	
1	Enter the calculation number/assigned control number obtained from Site Design Document Control.
2	Enter the revision number.
3	Enter the IWCP or Authorization Project Number.
4	Enter the package page count prior to release for implementation
5	Enter the Modification Description Title.
6	Designer - Print name.
7	Design Checker - Print name.
Section 2: CALCULATION	
	Use this section for calculations.

APPENDIX 2 - FORM 5

BILL OF MATERIAL



RFETS — ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Form 5 (1-V51-COEM-DES-210)

Bill of Material

Section 1: DESIGN PACKAGE IDENTIFICATION

1. IWCP/Authorization Project Number
2. Modification Description Title
3. Page of
4. Building No./Area
5. Parent System Title

Section 2: BILL OF MATERIAL

6. ITEM NO.	7. QUANTITY	8. DESCRIPTION / PART NO.	9. CONSEQUENCE OF FAILURE	10. CODE NO.	11. SSC/ PART AFFECTS	12. SYSTEM CATEGORY? IF YES (X)
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐

Section 3: FORM INITIATION

13. Initiator's Name (Print)
14. Location
15. Phone No.
16. Pager No.

(01/99)

APPENDIX 2 - FORM 5

BILL OF MATERIAL FORM COMPLETION INSTRUCTIONS

The information provided in the Bill of Material Section will assist the Material Engineer in determining the most cost effective, efficient, and timely method of procuring material.

Note: *Use the Bill of Material (continued) page or Continuation Sheet (Form 9) if more room is needed to complete any block on this form.*

Block **Instructions**

Section 1: DESIGN PACKAGE IDENTIFICATION

1 Enter the IWCP or Authorization Project Number.
2 Enter the Modification Description Title.
3 Enter the package count prior to release for implementation.
4 Enter the Building Number or Area.
5 Enter the parent system title that describes the items entered in Column 8.

Section 2: BILL OF MATERIAL

Note 1: *The following blocks are normally completed by the Designer but may also be completed by the Material Engineer or Project Engineer/Manager.*
Note 2: *This section is optional.*

6 Enter a sequential item number beginning with 1.
7 Enter the quantity of components/parts required.
8 Enter a description of the component or part (noun name, descriptors). Provide enough detailed information to ensure that the Planner or Material Engineer can identify the component/part.
9 List consequence of failure modes (for example, fire, flooding, steamline break, personnel exposure, life support system failure, loss of fire detection/mitigation).
10 Enter the applicable code(s) from the table below to assist Material Engineering in determining technical and quality requirements:

Code	Affect	Code	Affect
1	Affects Sys Cat 1/2 Operability	6	Affects Special Nuclear Material
2	Affects Worker Safety	7	Affects Security Systems
3	Affects Emergency Response	8	Affects Fire Protection
4	Needs Counterfeit Inspection	9	Hazardous Chemical
5	Environmental Barrier/Concern		

11 Enter any special procurement considerations that may affect Material Engineer's Procurement Level determination (for example, high temperature, high pressure, corrosive).
12. If yes for system category, (√) box.

Section 3: FORM INITIATION (REQUIRED)

13-16 Enter name, location, phone and pager number of the individual that initiated this form. This information is provided to identify a contact point for information provided on this form.

APPENDIX 2 - FORM 5

BILL OF MATERIAL (continued)

RFETS — ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Form 5 (continued) (1-V51-COEM-DES-210)

Bill of Material (continued)

Section 1: DESIGN PACKAGE IDENTIFICATION

1. IWCP/Authorization Project Number	2. Modification Description Title	3. Building No./Area	4. Parent System Title	5. Page of

Section 2: BILL OF MATERIAL

6. ITEM NO.	7. QUANTITY	8. DESCRIPTION / PART NO.	9. CONSEQUENCE OF FAILURE	10. CODE NO.	11. SSC/ PART AFFECTS	12. SYSTEM CATEGORY? IF YES (X)
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
						☐
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(01/99)

APPENDIX 2

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APPENDIX 2 - FORM 6

DESIGN WORK SPECIAL INSTRUCTIONS

RFETS ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

FORM 6 (1-V51-COEM-DES-210)

Design Work Special Instructions

Section 1: DESIGN PACKAGAE IDENTIFICATION

1. IWCP/Authorization Project Number	2. Modification Description Title	3. Page of

Section 2: DESIGN WORK IMPLEMENTATION REQUIREMENTS

4. Work IWCP Instructions (Provide justification if "None" is marked.) ☐ None

5. System Interactions (Identify System Category 1/2 and 3 interactions that will be impacted by this Design Package and need to be addressed during implementation. Provide justification if "None" is marked.) ☐ None

6. Acceptance Criteria, Standards, and Inspections (for example: acceptance, inspections, and post-maintenance tests). (Provide justification if "None" is marked.) ☐ None

7. Deviation to Industry or Site Engineering Standards with Technical Justifications (to include description, purpose and scope).

(01/99)

APPENDIX 2 - FORM 6

DESIGN WORK SPECIAL INSTRUCTIONS FORM COMPLETION INSTRUCTIONS

Specific installation and test instructions are provided for non-routine or complex designs. This form is used to communicate these work requirements..

Note 1: *If a block is not applicable, enter N/A. If information requested in Blocks 4-6 is not applicable, check the None box.*

Note 2: *Use the Continuation Sheet (Form 9) if more room is needed to complete any block on this form.*

Block	Instructions
Section 1: DESIGN PACKAGE IDENTIFICATION	
1	Enter the IWCP or Authorization Project Number.
2	Enter the Modification Description Title.
3	Enter the package page count prior to release for implementation.
Section 2: WORK IMPLEMENTATION REQUIREMENTS	
4	When required, the Designer clearly describes a construction work sequence, identifying responsibilities interfaces between all parties to ensure construction can be completed safely, as efficiently as possible, while maintaining system operability and minimizing downtime. Identify activities to be performed by operations personnel, or other subcontractors, before the contractor can initiate work.
5	Provide Systems Interactions information as indicated.
6	The EDP identifies testing and inspection of all equipment, components, and/or systems. Test procedures describe every test and operation to be performed for testing and inspecting equipment, components, and complete systems for functional operation. Identify desired inspections. Reference Site Engineering Standards, sections of national codes and standards, or other inspection plans as required. Equipment, component, and certain operational system testing, designated as Construction Component (CC) Tests, are stipulated by the Designer. The procedures for these tests list the items and operations necessary for checking the installation for conformity to the manufacturer's specification and to the drawings and specifications. The Designer utilizes applicable codes and standards whenever possible to define testing parameters. Critical CC design limit tests may, at the option of the Designer, be performed by vendors. CC testing may include the following as applicable: fan balancing, fan rotation, refrigerant charging of equipment, suction pressures, proof pressures entering and leaving air temperatures (dry bulb and wet bulb), pump flow and pressure, instrument calibration and initial settings, operability of remote and local controls, interlocks, temperatures. For electrical, the CC may include continuity megger, initial load readings for the power system, circuit breakers and switches are checked and manually operated to ensure shipping blocks and tie-downs have been removed. Systems Operational (SO) testing is normally required to verify conformance to drawings and specifications. Test procedures, when required are developed by the Designer. SO test procedures cover the complete operation of each system. SO tests include not only the determination that the system operating characteristics are as designed but are also used to complete the equipment/component testing if required. Examples of SO testing are: complete balancing of the HVAC distribution system; final calibration settings, sequencing, and functional control of all instruments, loops and control systems, calibration of circuit breakers and substation protective relays; load testing of emergency generators, isolated power systems, and uninterruptible power sources; and checking these systems for switching to emergency and then back to normal power.
7	Enter technical justification for deviations to standards as indicated. If applicable, document justification for boxes checked "None" in Sections 4 - 6.

APPENDIX 2 - FORM 7

BASELINE DOCUMENT CHANGE FORM

RFETS ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

FORM 7 (1V51-COEM-DES-210)

Baseline Document Change Form

SECTION 1: DESIGN PACKAGE IDENTIFICATION

1. IWCP/Authorization Project Number	2. Modification Description Title	3. Page of

SECTION 2: BASELINE DOCUMENT LIST

4. (Operations Manager) Check box if document requires update prior to return to service.
5. (Designer) Check box if documents require update and closeout by Engineering.
6. (Designer) Check box if change to master drawing at closeout.
7. (Designer) Check box if master drawing to be voided at closeout.

☐ PHASED CLOSEOUT (Designer) Check box if phased closeout.

SECTION 3: POST MOD MARKUP

4.	5.	6.	7.	8. Document Identification	9. Rev	10. Final Rev	11. Engineering Walkdown Verification	12. Site Design Document Control Receipt	13. Operations Manager Receipt
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SECTION 4: POST MODIFICATION MARKUP ACCEPTANCE BY OPERATIONS

14. Operations Manager – Name (Print)	15. Operations Manager - Signature	16. Date

SECTION 5: DOCUMENT UPDATE/ENGINEERING DOCUMENTATION CLOSEOUT (DO NOT COMPLETE - SDDC Internal Only)

17. ☐ Incorporated redline information into masters
☐ Engineering Design Database updated
OR ☐ Did not incorporate redline information at this time. Redline information retained

18. Site Design Document Control – Name (Print)	19. Site Design Document Control - Signature	20. Date

(01/99)

APPENDIX 2 - FORM 7

BASELINE DOCUMENT CHANGE FORM FORM COMPLETION INSTRUCTIONS

The Baseline Document Change Form (BDCF) is used to track Site controlled documents that are required to be revised at the completion of the work activity/project. Closure of the IWCP Package cannot occur until the Designer completes the redline process and delivers the design package (including redlines and the BDCF) to Site Design Document Control, Building 130.

Note 1: *If a block is not applicable, enter N/A.*
Note 2: *Use the Continuation Sheet (Form 9) if more room is needed to complete any block on this form or if the drawings listed on the BDCF do not exactly match the drawings actually attached to the EDP.*

Block **Instructions**

Section 1: DESIGN PACKAGE IDENTIFICATION

1 Enter the IWCP or Authorization Project Number.
2 Enter the Modification Description Title.
3 Enter the package page count prior to release for implementation.

Section 2: BASELINE DOCUMENT LIST

Note 1: *Phased closeout: Sections of the design package may be individually closed out before the final IWCP Type 2 or Type 3 Work Package is closed out*

Designer - If applicable, check box for phased closeout.

4 Operations Manager - Check corresponding box to identify documents requiring updated prior to return to service.
5 Designer - Check corresponding box to identify documents requiring update and closeout by Engineering.
6 Designer - Check corresponding box identifying change to master drawing at closeout.
7 Designer - Check corresponding box to identify master drawing to be voided at closeout.
8 Designer - Identify number (for example, drawing number, procedure number, vendor manual number, catalog number) or computer software name and number.
9 Designer - Enter the current revision level of document.
10 Designer - Leave blank until document update.
Site Design Document Control - Enter final revision level after document has been revised.

Section 3: POST-MODIFICATION MARKUP

Note 1 : *Columns 11-13 and Blocks 14-16 are completed after implementation of the Design Package.*
Note 2: *Columns 12 and 13 are only used if single or multiple components or systems are being returned to service (phased implementation). Instructions for Column 11 are to be followed for both full and phased implementation.*

11 A. Perform a post-modification walkdown to redline drawings (N/A for sketches or computer software).
B. Redlines must include all field changes.
C. Sign and date indicating the redline has been verified. Then perform the following:
a. Obtain a copy of the BDCF and the redlined drawings.
b. Deliver redline drawing copies to building Operations.
c. Deliver field redlined EDP (which includes redlined controlled drawings) with an EO (AMN-101, Appendix 1) to Site Design Document Control before the IWCP Type 2 or Type 3 Work Package is closed.
d. Complete the Engineering closure signature line on the IWCP Type 2 or Type 3 Work Package Cover Sheet (see IWCP, Appendix 5.1).

12 Site Design Document Control - Initial and date indicating receipt of specific line item redlined document. Use Blocks 17-20 if all redlined documents are submitted at one time (N/A for computer software).
13 Operations Manager - Initial and date indicating receipt of field verified markups. Use Blocks 14-16 if all requested markups are received at one time (N/A for computer software).

Section 4: POST-MODIFICATION MARKUP ACCEPTANCE BY OPERATIONS

14-16 Operations Manager - Print/sign name and date indicating walkdown is complete and that redlined drawings have been submitted to the building document control or the Operations Manager. This acceptance signature satisfies the Return to Service requirement in MAN-066-COOP, Site Conduct of Operations Manual.

Section 5: DOCUMENT UPDATE / ENGINEERING DOCUMENTATION CLOSEOUT (DO NOT COMPLETE – For SDDC Use ONLY)

17-20 Site Design Document Control - Print/sign name and date indicating that all required markups listed on the BDCF have been (1) incorporated OR (2) retained as redlines AND (3) updated in the Engineering Drawing Database.

APPENDIX 2 - FORM 8
REVIEW COMMENT SHEET

RFETS ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Form 8 (1-V51-COEM-DES-210)

Review Comment Sheet

Section 1: DESIGN PACKAGE AND REVIEWER IDENTIFICATION

1. IWCP/Authorization Project Number	2. Modification Description Title	3. Page of

4. Type of Review ☐ Design Check ☐ Independent Verification ☐ Other (specify): — 5. Due Date

Section 2: REVIEW COMMENTS AND DISPOSITION

6. No.	7. Reference: Page, Para., Dwg. #, etc.	8. Comments: Provide comment and proposed resolution.	Accept ✓	Reject ✖	9. Proposed Comment Disposition: Plans to Incorporate Comments OR Justification for Rejection	10. Date Comment Closed

11. ☐ No Comments ☐ No impact or relevance to discipline or organization.

Reviewer's Name (Print) _____ Reviewer's Signature _____

Ext./Pager/Fax _____ Bldg./Organization _____ Date _____

12. **FULL CONCURRENCE:** I have reviewed the document referenced above from my organization's discipline-specific point of view and concur fully with its implementation. All comments and concerns have been resolved to my satisfaction.

Print Name _____ Concurrence Signature _____ Date _____

13. **FINAL COMMENT DISPOSITION:** I have made final disposition for all comments not resolved to the satisfaction of the reviewer. Technical justification for the disposition of these comments is attached.

Print Name _____ Responsible Engineering Manager Signature _____ Date _____

Ext./Pager/Fax _____ Bldg./Organization _____

(01/99)

APPENDIX 2 - FORM 8

REVIEW COMMENT SHEET FORM COMPLETION INSTRUCTIONS

This form is used to document Engineering Design Package comments from reviewers performing Engineering Interdiscipline Reviews. The form is also used to document proposed disposition of comments and disposition concurrence.

Note 1: *Use the Review Comment Sheet (continued) form included with Form 7 if additional space is required to enter comments or document comment disposition.*
Note 2: *Designer - Complete Blocks 1, 2, 4 and 5 and include this form with the EDP before issuing for review.*
Note 3: *Reviewer - Record all comments on the Review Comment Sheet(s).*

Block	Completed By	Instructions
Section 1: DESIGN PACKAGE AND REVIEWER IDENTIFICATION		
1	Designer	Enter the IWCP or Authorization Project Number.
2	Designer	Enter the Modification Description Title.
3	Reviewer	Enter the package page count after review is completed.
4	Designer	Check the box which identifies the type of review. If the "Other" box is checked, specify the type of review being performed.
5	Designer	Enter date comments are due.
Section 2: REVIEW COMMENTS AND DISPOSITION		
6	Reviewer	Number all comments sequentially, starting at 1.
7	Reviewer	Enter reference to specific item being addressed (for example, page and paragraph number, drawing number, calculation number).
8	Reviewer	Provide short concise comments. For each comment, provide a proposed resolution.
9	Designer	Indicate if the comment is accepted or rejected by placing a v in the first column (indicating acceptance) or an X in the second column (indicating rejection). If accepted, enter specific plans for incorporating comments. If rejected, provide justification for the rejection.
10	Designer	This column is used for tracking comment resolution concurrence. Enter date comment disposition is accepted.
11	Reviewer	Check the "No Comments" box if no comments are submitted. Check "No impact or relevance to discipline or organization" box if appropriate. Print name and sign. Enter Extension/Pager/Fax, Bldg/Organization, and Date.
12	Reviewer/Concurror	After comments have been acceptably dispositioned or if no comments have been submitted, print name, sign, and date indicating full concurrence as stated on form.
13	Responsible Engineering Manager	If comment disposition has been escalated due to inability to reach an acceptable resolution, document final disposition and justification and attach to this form. Obtain reviewer concurrence for remaining comments. Print name, sign and date to document final comment disposition. Enter Extension/Pager/Fax and Bldg/Organization.

APPENDIX 2 - FORM 8

REVIEW COMMENT SHEET (continued)

RFETS ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Form 8 (Continued) (1-V51-COEM-DES-210)

Review Comment Sheet (continued)

Section 1: DESIGN PACKAGE AND REVIEWER IDENTIFICATION

1. IWCP/Authorization Project Number	2. Modification Description Title	3. Reviewer's Name (Print)	4. Page of

Section 2: REVIEW COMMENTS AND DISPOSITION

6. No.	7. Reference: Page, Para., Dwg. #, etc.	8. Comments: Provide comment and proposed resolution.	✓ Accept	✗ Reject	9. Proposed Comment Disposition Plans to Incorporate Comments OR Justification for Rejection	10. Date Comment Closed

(01/99)

APPENDIX 2

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APPENDIX 2 - FORM 9

CONTINUATION SHEET

RFETS ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

FORM 9 **(1-V51-COEM-DES-210)**

Continuation Sheet

Instructions:
1. This form may be used as a continuation sheet for any form in 1-V51-COEM-DES-210.
2. Complete Blocks 1-3 to identify the form being continued and Block 4 to identify the specific blocks being continued.
3. Initial and date each entry on this form.

Section 1: DESIGN PACKAGE IDENTIFICATION

1. IWCP/Authorization Project/Calculation Number	2. Modification Description Title	3. Continuation of (Form Name):	4. Page of

4. Block No.	5. Continuation

(01/99)

TO DISTRUBUTION January 25, 1999	Name: Susan Bailey Org: Document Control Location: T130G Ext. 4738
UPDATE # 15 CONDUCT OF ENGINEERING MANUAL TABLE OF CONTENTS 1/15/1999 1-W56-COEM-AMN-101, REV 1 SDITE DESIGN DOCUMENT CONTROL 1-V51-DES-COEM-210, REV 4 DESIGN PROCESS REQUIREMENTS 2-K09-COEM-DES-235, REV 1 PRESSURE VESSELS, SYSTEMS AND RELIEF DEVICES	 Please replace the TOC dated 11/19/98 with TOC dated 1/15/99. Please replace Rev 0 with Rev.1. Please replace Rev 3 with Rev. 4. Please remove this procedure from your manual it has been canceled.